

SECTOR 4 — CHART INFORMATION

SECTOR 4

THE KIRIBATI ISLANDS TO THE MARSHALL ISLANDS (INCLUDING THE TOKELU ISLANDS, TUVALU, AND OFF-LYING ISLANDS AND REEFS)

Plan.—This sector describes five island groups, some individual islands, and two island atolls, with each group set apart under a separate heading. The descriptive sequence is from Johnston Atoll in the North Pacific Ocean to about 1,200 miles S to the Kiribati Islands in the South Pacific Ocean, between 2°50'S and 4°40'S, and 170°43'W and 174°31'W. Further S to the Tokelau Islands, between 8°32'S and 9°26'S, and 171°11'W and 172°32'W, then about 457 miles W to the Tuvalu (Ellice Islands), between 5°S and 11°S, and 176°E and 180°. Between 2°45'S and 3°30'N, and 172°30'E and 177°15'E lies the Gilbert Island group. Further NNW is the Marshall Island group between 4°34'N and 14°32'N, and 162°20'E and 172°07'E in the North Pacific Ocean. Wake Island lies further N in 19°16'N, 166°40'E.

General Remarks

4.1 The Gilbert Island group lying between 2°40'S and 3°20'N, and 172°40'E and 177°00'E are the possessions of the Republic of Kiribati. The Tuvalu group (Ellice Islands) comprise the nation of Tuvalu. The Marshall Islands make up the Republic of the Marshall Islands.

Large-scale chart coverage for U.S. territory located within this sector is provided by the National Ocean Service. Regulations pertaining to navigation within U.S. territorial waters may be found in the U.S. Coast Pilots, while additional regulations will be cited in the text along with the navigational feature they affect.

Kwajalein Missile Range—Warning Area.—Intermittent, hazardous missile operations are conducted within an area with a radius of 200 miles, centered at 8°43'N, 167°43'E. See the Kwajalein Atoll description in [paragraph 4.61](#) for details.

4.2 Johnston Atoll (16°45'N., 169°31'W.) ([World Port Index No. 56325](#)), a possession of the United States, consists of four islets that lie on a reef about 9 miles long in a NE-SW direction. Johnston Island, the largest island, lies about 2 miles inside the SW end of the reef. **Sand Island** (16°45'N., 169°31'W.) and Hikina Island lie about 1 and 2 miles NE, respectively, of Johnston Island; Akau Island is about 1 mile N of Sand Island.

Johnston Atoll is a Naval Defense Sea Area and Airspace Reservation. The island is closed to the general public and to unauthorized traffic and shall not be navigated within 3 miles of the atoll's perimeter. Johnston Atoll is administered from Washington, DC by Pacific Air Forces, Hickmans AFB, and the Fish and Wildlife Service of the US Department of the Interior as part of the National Wildlife Refuge system.

Authorities at Johnston Atoll must receive ship visit requests a minimum of 5 days in advance, with the following information:

1. Purpose and authority of visit.
2. Name and type of vessel.

3. Vessel itinerary.

4. Crew and passenger manifest.

Winds—Weather.—Winds average 10 to 15 knots in summer and 15 to 25 knots in winter. They are from the E to NE about 90 per cent of the time. The occasional Hawaiian Island storms are characterized by stormy S or SW winds and heavy rains.

Brief showers occur frequently, but protracted bad weather is rare. Visibility is good, usually over 12 miles.

Tides—Currents.—In the main entrance channel there is usually a flow to the N during the flood and a flow to the S during the ebb, at a rate of 1 to 2 knots. The HW interval is 3 hours 15 minutes. The mean range of the tide is 0.6m.

When there is a heavy swell on the barrier reef, there may be a strong E set at the junction of the main entrance channel and basin, especially with the ebb tidal current.

Depths—Limitations.—The main entrance channel is entered S of Johnston Island and is marked by buoys, beacons, and range lights. Maximum draft for vessels entering the harbor under normal conditions is 8.5m. The largest vessel to enter was 200m long. The harbor consists of a turning basin within the lagoon about midway between Johnston Island and Sand Island. The turning basin and harbor area are dredged to 10.7m. The berthing area alongside the 174m Main Pier has been dredged to 9.1m. The Naval Pier is a jetty situated 0.15 miles E of the Main Pier with a length of 122m and a draft of 4.6m. Ships berth starboard side to the Naval Pier. Sand Island Quay is of wooden construction and 18m in length.

A barrier reef extends in an arc from about 2 miles W to about 7 miles NE of the islands. Depths outside the reef drop off to 200m about 0.4 mile off. With heavy breakers on the reef, a 0.6m to 0.9m surge exists in the lagoon. From the NE, via S to SW is a foul area with a very irregular bottom. The 200m curve lies 4 miles S of the center of Johnston Atoll; however, there are 10.4m shoals lying as close as 0.3 mile inside the curve and to the SE of the atoll.

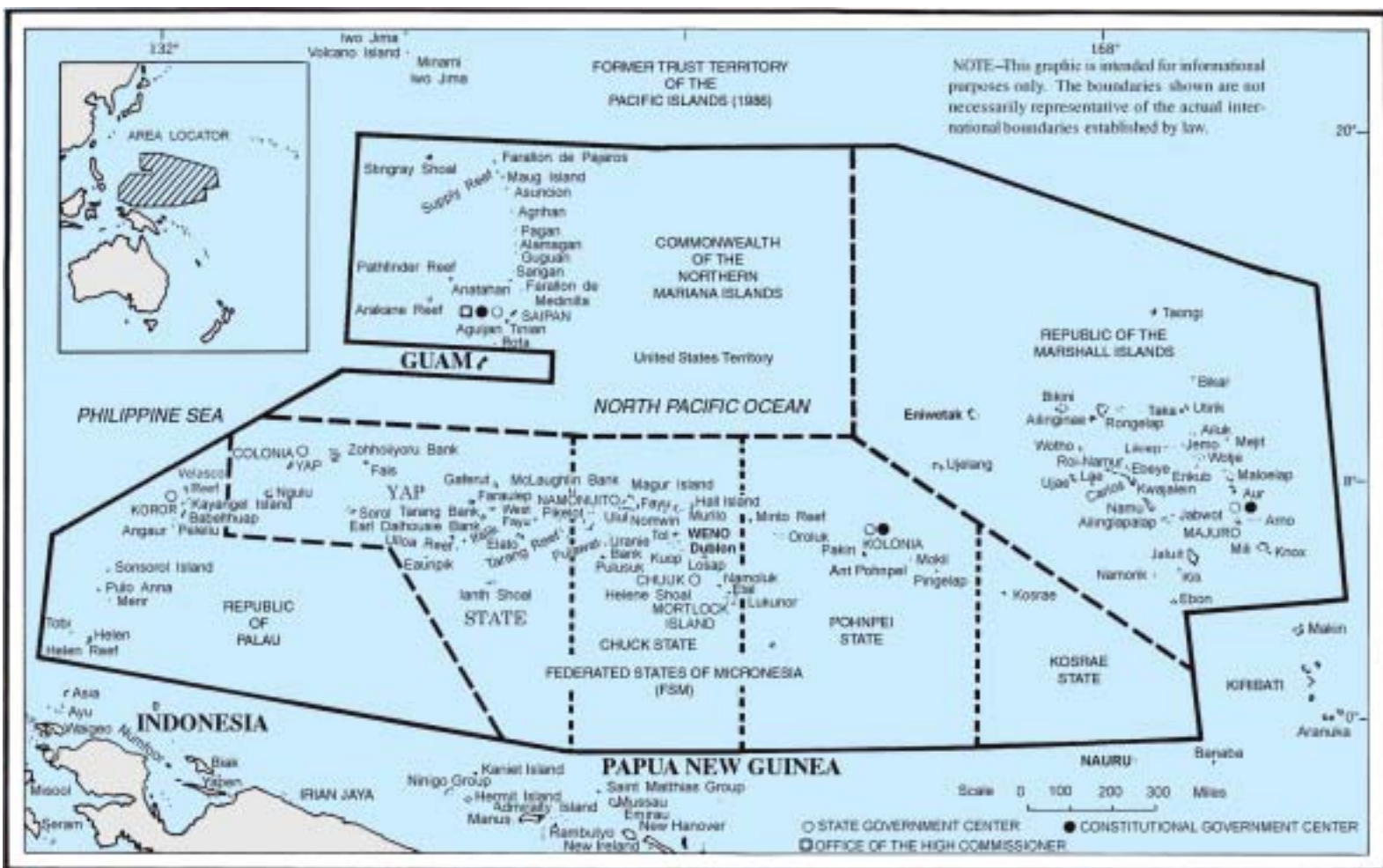
The Joint Operations Building, with its aviation beacon, stands on the NE end of the island. The Johnston Atoll Chemical Agent Disposal System (JACADS) stands on the SW portion of the island. JACADS is scheduled for closure in 2003. Both buildings are prominent. Sand Island has several buildings which show as separate radar targets. The outline of the island does not show until within 10 miles of the island.

Pilotage.—No licensed pilots are available locally. The Harbormaster boards all vessels proceeding into the harbor. Ships should not enter at night or when cross channel winds exceed 25 knots. The pilot boards 2 miles S of Lighted Buoy R2.

Regulations.—All persons on board shall be U.S. citizens.

As of April 1968, entrance to the harbor is not recommended at night. Ships are required to night steam or anchor 3 miles S of Johnston Atoll to wait for daylight.

Observe carefully the rules and regulations prescribed by the Commander for navigation in harbors and anchorages of



Johnston Atoll, and have onboard an officer familiar with these waters while underway in these areas.

While anchored the vessel will maintain steam up and have engines ready to get underway.

Dogs, cats, and other animals shall be confined onboard.

Plants and fruits will not be imported without specific authority of the Commander of Johnston Atoll.

Anchorage is prohibited in an area situated near the center of the turning basin.

Communications with the atoll are under military supervision. Ships are requested to contact Johnston Atoll when within 100 miles of the atoll. The atoll can be contacted on VHF channel 16, VHF 121.5 MHz, and UHF 243.0 MHz; these frequencies are guarded 24 hours. Radio contact can also be established on other pre-coordinated marine frequencies.

Anchorage.—Vessels drawing more than 8.5m anchor in the channel approach area S of the channel entrance.

Anchorage is prohibited within the area of an arc extending 1.5 miles S and SE from Lighted Buoy R2 in position 16°42'52"N, 169°31'04"W.

Directions.—Vessels bound for Johnston Island ship channel should approach the channel from the S, passing through position 16°41'N, 169°31'W and then proceeding to the pilot boarding position.

4.3 Rional Reef (17°16'N., 177°16'E.), **Rene Reef** (16°44'N., 179°00'E.), and **Schjetman Reef** (16°08'N., 178°56'W.) were searched for in 1923 and were not found within a radius of 20 miles of their assigned positions. Schjetman Reef and the unnamed reef lying 40 miles ENE were searched for in 1963, but were not located.

On July 24, 1945, sonar ranging gear gave distinct echoes of a suspected shoal or reef at 16°25'N, 178°22'W.

A vessel reported (1944) sighting a suspected shoal in 14°30'N, 179°02'W. The discolored water covered an area 9 by 23m, and was estimated to be from 9.1 to 14.6m in depth.

A shoal, the existence of which is doubtful, is shown on the chart at 13°33'N, 170°24'W. In 1946, a vessel reported finding no indication of shoaling in this position.

Shoals, the existence of which is doubtful, are shown on the chart at 10°00'N, 179°40'W and 10°00'N, 179°30'E. Several old reports assign the following positions to dangers in this locality:

- a. 10°00'N, 180°00'.
- b. 10°00'N, 179°21'W.
- c. 10°00'N, 179°21'E.
- d. 10°00'N, 179°30'E.
- e. 10°00'N, 179°15'E.

Wilder Shoal (8°17'N., 173°25'W.) is reported to be about 30m in diameter, with an approximate depth over the shoal of about 5.5m.

The Kiribati Islands (Phoenix Islands)

4.4 The Kiribati Islands (Phoenix Islands) are a group comprised of Canton Island, Enderbury Island, Phoenix Island, Birnie Island, Orona Atoll (Hull Island), Manra Atoll (Syney Island), McKean Island, and Nikumaroro Atoll (Gardner Island). The Kiribati Islands, including Canton Island and

Enderbury Island, became independent on July 12, 1979 to form part of the Republic of Kiribati.

The group lies about 1,230 miles S of Johnston Atoll. The islands on atolls are low and of coral formation, surrounded by fringing reefs which in most cases are steep-to. With the exception of the atolls, the islands are almost devoid of vegetation, and navigation in their vicinity at night is dangerous due to the difficulty of distinguishing them.

Phoenix Island (3°43'S., 170°43'W.) is a treeless, triangular, coral atoll surrounded, except for the middle third of the W or longest side, by a wide platform reef. The reef bares at LW. Depths of less than 9.1m are found within 0.25 mile of the SE and NE sides. Shoals, which break heavily, extend about 0.4 mile off the NW end of the island. The land rim is about 4.9m high, 30m inshore from the reef. The first rise is covered with loose coral fragments washed in from the sea. The island is uninhabited. It is a wildlife sanctuary. Phoenix Island has been reported to give good radar returns up to 11 miles.

Winds—Weather.—Winds are always E. Usually, they vary from ENE to ESE, with the latter predominating.

Tides—Currents.—The current sets strongly past the N and S points of the island, converging on the W side. Close in to the shore on the W side of the island, the flood sets N and the ebb sets S. Offshore, the set is W about 0.5 knot, varying in strength and direction with the surface currents set up by the prevailing wind.

Enderbury Island (3°08'S., 171°05'W.) is a coral island consisting of a rim averaging 3.9m high, with a sunken central plain about 1.2m above sea level. The island is steep-to, with a very short reef which makes landing difficult because of the strong sweep of the undertow on the shelving shore. The shelf extends only about 68.5m and drops off rapidly except at the N and SE corners.

Winds—Weather.—The winds vary from the NE to SE. There are frequent, but usually brief rain squalls and they cannot be depended on as the sole water supply.

Tides—Currents.—Immediately W of the island, the current sets to the S with a strength of about 1 knot. In very strong flood tides this set may be reversed. Clear of the island, to the N or S, the average set is about 0.8 knot in a 255° direction.

Aspect.—A mast, marked by red obstruction lights, exists about 0.8 mile S of the N extremity. The most conspicuous objects on the island are several palms at the N end; a large guano heap, about 6.1m high on the W side; and the buildings of the settlement at the S part of the island.

Anchorage.—During the season of the Southeast Trades, there is opportunity to anchor on the spit off the NE point, in depths of 45 to 55m, coral and sand. The anchorage should be approached slowly from the WNW with constant use of the depth sounder, as the spit is very narrow and may be overrun easily.

The observed set of the current at this anchorage is to the NW, which keeps the stern away from the shore.

Anchorage here is not recommended when the Northeast Trades are blowing.

Directions.—The landing place is on the W side of the island, just N of the settlement. Ships may approach the island to within less than 0.8 mile at this point. Landing may be

affected by a surfboat through a channel in the reef leading in on a range of two beacons, in line bearing 092°. Great care must be used in landing as the reef is short and steep, and the channel is narrow with rapid shoaling toward the landing. The best landing conditions prevail at HW and with a strong E wind, which flattens the swell that usually sets in from the S.

4.5 Canton Island (2°50'S., 171°43'W.) ([World Port Index No. 56025](#)) is located about 35 miles WNW of the NW extremity of Enderbury Island. It is a coral atoll, enclosing a large lagoon studded with coral heads, and crossed by numerous barrier reefs. As an atoll, it is unique in that the land rim is unbroken except for two openings on the W side. The surf breaks on the N extremity; off the S extremity, heavy tide-rips extend about 0.5 mile from the weather side of the island. The lagoon is infested with shark, moray eel, and ray.

Winds—Weather.—The prevailing winds 90 per cent of the year are E, ranging from ENE to ESE, with an average velocity of 12 to 15 knots and moderate seas. High winds, 25 to 30 knots, and rough seas are infrequently experienced during the months of April, May, and June. During heavy weather, vessels have been held up from entering or leaving the harbor for periods of 2 to 3 days, occasionally extending to 5 days.

There are no noticeable seasons throughout the year. Temperatures range from a night low of 24°C to a daytime high of 35°C.

Tides—Currents.—Close to the W shore the flood sets 325°. In the lagoon entrance, the current runs 6 to 8 knots at the strength of the flood and the ebb. The current has been observed to run as high as 11 knots at the ebb, with a strong E wind blowing. Ebb currents produce a marked rip when mixing with ocean currents up to 1 mile or more off the entrance channel.

The ocean current near the island sets about 255° at about 0.8 knot, but is much stronger at the NW and SE points of the island. A vessel lying off the W shore may expect to be set off at the average rate. Local weather conditions make both tide and current predictions inaccurate, and vessels entering the harbor should contact local authorities for information regarding conditions at time of entering.

Depths—Limitations.—The channel had a controlling depth of 7.6m, but in 1988, the channel was reported to have a least depth of 9.1m. Depths of 4.5m were reported immediately outside the channel. Shoaling, which was visible in daylight, was occurring on the Spam Island side of the passage.

Anchorage.—There is fair anchorage on the coral shelf just off the lagoon entrance for vessels drawing less than 7m, in charted depths of 13 to 25m, white coral sand, good holding ground.

Care must be taken to insure the vessel anchors on the shelf, as the depth increases abruptly to depths over 30m a short distance seaward.

At this anchorage the ship will swing from 040° to 160°, but will not swing into the beach while the trade winds are blowing. West winds are practically unknown at this island.

Local opinion, supported by that of masters who have visited the island, is that there is no good anchorage for a vessel too large to enter the harbor. Smaller vessels, waiting for slack water, are advised to stand offshore.

Directions.—A vessel entering the lagoon in 1988 recommended favoring the NW side of the channel, however, bank suction should be guarded against. The pier face was reported to be in good shape, but the bollards were in poor condition. The depth alongside the pier was not stated. It is recommended that vessels berth starboard side-to.

Caution.—The strong current, strong wind, and small space in which to maneuver a fairly large vessel make entry quite hazardous. A speed of 5 to 8 knots must be maintained to stem an ebbing tide in the channel, and to navigate the turn at the lagoon end of the channel. The current in this channel runs as high as 10 knots on both flood and ebb, and the periods of slack water are almost negligible. The channel is on the lee side of the island, and a strong wind may prolong the period of ebb and shorten the period of flood tides. Vessels should plan to enter during daytime at HWS and leave at LWS in order to insure that they will be stemming the current. Also, a boat should be sent close inshore to sound the passage, observe the tidal currents, and to report when conditions are suitable for the vessel to proceed.

An explosives dumping area has been established SW of Canton Island, between 3°09'S and 3°28'S, and between 171°53'W and 172°13'W.

4.6 Birnie Island (3°35'S., 171°31'W.) lies about 43 miles S of the S extremity of Canton Island. The island is 3.6m high on the rim, sloping gradually to sea level at a shallow brackish pond located about 90m inland from the E side of the island. Birnie Island is a bird sanctuary.

A flat fringing reef, drying at LW and extending as far as 0.1 mile offshore, surrounds the island. A shoal, which breaks in heavy weather, extends 0.7 mile S from the S point of the island. A stone monument on the E side of the island, about midway of the length, is visible 6 miles and is a radar target for the same distance.

Tides—Currents.—Close into the W shore the current sets N. Farther off, the set is W and is usually at a rate of about 0.5 knot, with the strength and direction varying with the surface currents set up by the prevailing wind.

Anchorage.—Anchorage is possible about 0.3 mile off the NW point, in 16.5m, with E winds. The S spit is considered too dangerous for anchorage, as it drops off from a depth of 3.7m to 54.9m within 90m.

4.7 Manra Atoll (Sydney Island) (4°27'S., 171°15'W.) is a triangular atoll located about 54 miles SSE of Birnie Island. The land rim of the atoll is about 4.6m high, and is covered with brush and trees entirely enclosing a circular lagoon. The island has been reported to give good radar returns up to 7 miles.

Winds—Weather.—The winds at Manra Atoll are almost always E, those of the SE quadrant predominates.

Tides—Currents.—Off the island, the set is W at a rate of about 0.5 knot, varying in strength and direction with the prevailing wind. Close inshore it conforms to the shoreline, diverging at the E extremity and converging at the W extremity.

Aspect.—With a NW wind blowing or at LW, it is better to land on the S side just E of the island. At this point, there is a fissure in the reef wide enough for a boat to enter if properly handled. The passages were reported improved by blasting.

Anchorage.—There is anchorage off the W side of the island, in about 16.5m, about 0.1 mile off the reef sheltered from the prevailing winds. From November to April, NW winds may be expected replacing the prevailing E winds.

4.8 Orona Atoll (Hull Island) (4°30'S., 172°10'W.) is a coral atoll surrounded by a flat fringing reef, which dries in patches and is about 270m wide. The shelf drops off quickly except at the E extremity, where there is a least depth of 110m, 0.4 mile offshore. At all other points, the 200m curve is within 0.3 mile of the atoll.

The land rim of the atoll is about 0.3 mile wide and encloses a large and relatively clear lagoon. On the SE side of the atoll there are some passes from the lagoon to the outer reef which are fairly deep at HW, but there is no communicating channel through the reef. It was reported that the passes in the reef were improved by blasting.

At the W end of the atoll there are coconut palms from 12 to 18m high; the remainder of the atoll is covered with palm trees and brush, 6 to 12m high. There is a village in ruins on the W part of the atoll.

The lagoon has depths up to 14.6m and 16.5m in places, but it is foul, with numerous shoal coral heads. The larger and shallower heads have been marked with buoyed gasoline drums.

Tides—Currents.—Close into the shore, the current sets W along the atoll with an average velocity of 1 knot. Offshore, the set is W about 0.5 knot, varying with the surface currents set up by the wind. The tidal current in the blasted channel through the reef in the NE part of the atoll is very strong, ranging up to 5 knots.

The E channel, the widest and deepest, carries about 0.9m of water at the spring tides. A channel has been blasted through the W extremity of the reef.

Anchorage.—There is anchorage for small vessels in E winds only, in a depth of about 18.3m, about 0.1 mile off the W extremity of the reef. It is recommended that vessels with a draft of more than 6.1m lie off the W end of the atoll.

4.9 Nikumaroro Atoll (Gardner Island) (4°40'S., 174°31'W.) is a wooded, wedge-shaped atoll lying about 137 miles W of Orona Atoll (Hull Island). The atoll is surrounded by a fringing reef, which dries at LW, extending about 0.2 mile offshore. The NW and SE extremities of the reef appears to be extending. Depths off the atoll, which is steep-to except at its NW and SE extremities, average 366m, 0.3 mile from the reef. Nikumaroro Atoll (Gardner Island) encloses a lagoon into which there is no navigable passage. With the exception of two breaks, a large one on the W side and a narrow one on the S side, the land rim of the atoll entirely surrounds the lagoon.

The lagoon is encumbered with coral heads, but seaplanes have landed successfully.

A conspicuous stranded wreck lies close W of the N extremity of the atoll. The wreck was reportedly breaking up.

Tides—Currents.—Off the atoll the set is W, and varies in direction and strength with the prevailing wind. Close inshore, the current follows the trend of the land to the W.

There is a deserted village on the W side of the atoll, about 1 mile S of the N extremity, off which anchorage may be

obtained by small vessels, very close inshore. Two small beacons N of the village indicate the approach.

Directions.—The best landing place, marked by a white pyramidal concrete structure, is about 0.3 mile S of the village. A boat channel has been cut through the reef in a 054° direction and in line with the concrete beacon. Landing should be attempted just after HW when there is less surf than on a rising tide. With a SE wind, landing can be effected in the lee of the wreck at any stage of the tide. The reef is extremely slippery and wide, and the landing is not recommended if any equipment is to be landed or brought off.

4.10 McKean Island (3°36'S., 174°08'W.) is a treeless coral island, nearly 0.5 mile round in shape, set on a heart-shaped reef. Breakers extend about 0.3 mile from the N end and 0.2 mile from the S end of the island. The most conspicuous object on the island is the ruin of a large building on the W side, with a coral slab, 2.1m high. Scattered about are the ruins of several structures, obviously part of the old guano works. The island is a wildlife sanctuary.

Winds—Weather.—The winds are nearly always E, varying from NE to ESE, with the former predominating.

Tides—Currents.—The current sets strongly past the N and S points, converging on the W side of the island. Close in to the shore on the W side, the flood sets N and the ebb S. Offshore, the set is W with an average velocity of 0.5 knot, but varying in strength and direction with the prevailing wind.

Carondelet Reef (5°34'S., 173°51'W.) lies about 118 miles SSW of McKean Island, with a minimum depth of 3.7m. The reef does not bare at any stage of the tide and breaks only in moderate or rough weather. Depths just off the reef are from 9.1 to 18.3m and increase rapidly when beyond a distance of 0.5 mile.

Islands and Dangers North of the Kiribati Islands

4.11 A vessel reported (1954) sighting a reef about 1 mile long in an E-W direction at 0°56'S, 174°51'W. The reef was clearly visible, and the water in the general area was discolored.

Winslow Reef (1°36'S., 174°57'W.), about 38 miles S of the above-mentioned reef, is about 1 mile long in a E-W direction and 0.5 mile wide in a N-S direction with the shallow area toward the W. A minimum depth of 11m has been indicated. The NW and SE edges of the reef come out into points. The sides of the reef drop off steeply on all sides.

The existence of a possible uncharted reef was reported in 1983. The approximate position is 2°21'S, 175°19'E. This position is approximately 47 miles SSW of Winslow Reef.

A W set was reported in the vicinity of Winslow Reef.

An uncharted reef was reported lying about 30 miles SE of Winslow Reef in position 1°51'S, 174°34'W.

Baker Island (0°13'N., 176°28'W.), about 275 miles NNW of McKean Island, is nearly flat, but rises to an elevation of 6.1m at its SW extremity. At this point there is a steep, sandy beach which extends some distance N; elsewhere, the island is fringed by a coral reef. On the N and E sides of the island an extensive shoal, with depths of less than 7.3m in places, extends about 0.8 mile. The surf breaks heavily on the E side

and the SW extremity of the island. The W side of the island is to leeward under prevailing wind conditions.

Winds from the E predominate throughout the year. From December to May, the prevailing winds are sometimes interrupted by W winds and bad weather.

Regulations.—Baker Island is a National Wildlife Refuge under the administrative responsibility of the U.S. Fish and Wildlife Service. The refuge extends outward to the 3-mile limit. Entry into the refuge without a permit is prohibited except in an emergency. Permits must be obtained from the Refuge Manager, Hawaiian/Pacific Islands National Wildlife Refuge Complex, U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, P.O. Box 50167, Honolulu, HI 96850.

There is no sheltered anchorage. Vessels lie off the island and discharge to landing craft. The fringing coral reef surrounding Baker Island makes landing difficult. The S point of the island can be used for landing when winds are from NE.

Caution.—Tangent bearings of the island are unreliable.

4.12 Howland Island (0°48'N., 176°38'W.), about 38 miles NNW of Baker Island, is a low, flat island devoid of vegetation other than a few stunted trees. It is ringed by a relatively flat coral reef almost completely exposed at LW extending out to about 0.1 mile, except on the W side where the reef averages about 73m in width. Outside of this reef is a coral shelf extending about 0.3 to 0.5 mile on the N, E, and S sides, and about 0.1 mile on the W side. The depths on this shelf vary between 5.5 to 21.9m.

A broad, sandy, and in some places, gravelly beach slopes upward at a slight angle on the W side of the island. On the windward, or E side, there is practically no beach and the island rises abruptly from the reef to an average height of 3.7m, with the highest point about 5.5m in the N part. Amelia Earhart Daybeacon is situated near the center of the W side of the island.

Winds—Weather.—Winds from the E predominate throughout the year. From December to May, the prevailing winds are sometimes interrupted by W winds and bad weather.

Regulations.—Howland Island is a National Wildlife Refuge under administrative responsibility of the U.S. Fish and Wildlife Service. The refuge extends outward to the 3-mile limit. Entry into the refuge without a permit is prohibited except in an emergency. Permits must be obtained from the Refuge Manager, Hawaiian/Pacific Islands National Wildlife Refuge Complex, U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, P.O. Box 50167, Honolulu, HI 96850.

Anchorage.—A vessel anchored (1966) 0.4 mile from the N end of the island in 22.8m, with the E tangent of the island bearing 144°, the W tangent bearing 185°, and the daybeacon bearing 167.5°. A vessel anchored (1967) about 0.3 mile NNE of the N end of the island in 11.9m, with the E tangent of the island bearing 153°, the W tangent bearing 213°, and the daybeacon bearing 176°, distance 1 mile.

The Tokelau Islands

4.13 The Tokelau Islands, comprises three atolls, namely Atafu Island and Nukunonu Atoll (Nukunono Atoll), to the NW, with deep channels between, and Fakaofu, to the SE; they lie about 241 miles S of the Phoenix Island group. A W set at a

rate of about 1 knot has been experienced in the vicinity of the group in the months of June and September.

Caution.—Fish Aggregating Devices have been moored 0.4 to 0.5 mile W of the atolls. Vessels should exercise caution when within the vicinity.

Atafu Island (8°32'S., 172°31'W.) is an atoll consisting of a number of islets lying on a triangular-shaped reef which encloses a lagoon. The reefs surrounding the atoll are mostly steep-to. The islets are covered with coconut, pandanus, and low trees. A conspicuous clump of casuarina trees is located on the S islet of the atoll. Masts, 21m high, stand on the S side of Atafu Island, the NW island of the atoll. There is a passage, S of the island, into the lagoon that lighters can use.

Landing can be effected at the S end of the NW islet. It is difficult to land except within 2 hours of HW.

Caution.—In 1977, a shoal was reported 133 miles ENE of Atafu in 7°47'S, 170°23'W.

4.14 Nukunonu Atoll (Nukunono Atoll) (9°11'S., 171°52'W.), consisting of several islands, lies about 45 miles SE from the SE extremity of Atafu Island. The N part of the atoll is a bare reef, awash, upon which the sea breaks heavily. A church on the SE side of Nukunonu Atoll is conspicuous from the W; near the W extremity is a noticeable clump of bushes, 2.4 to 3m high. A red and white mast stands on an island SE of Nukunonu Atoll.

During offshore winds, fair anchorage can be obtained on the shelf of the reef, in 27.4m, coral bottom, on the W side of the atoll, about 0.6 mile S of the N extremity of Nukunonu Atoll.

Landing is dangerous, but canoes can land abreast at the village on Nukunonu, or about 2 miles N, according to the direction of the wind. A boat channel, with a reported depth of 1.2m, lies off the church and is protected by boulder breakwaters. This channel, which leads to a landing on a sandy beach, breaks heavily during SSE winds.

Caution.—Caution is advised, as the boat passage was damaged in a storm in 1987. The passage is littered with rubble, and is no longer marked by boulders.

Fakaofu (9°23'S., 171°15'W.), about 35 miles ESE of Nukunonu, consists of 61 islets lying on reefs which encircle a lagoon. The reefs which form the sides of the atoll are awash at LW, but bare in places with coral rocks and boulders emerging from the water. The surf is heavy on the NE or weather side, but moderate on the W side. The lagoon contains a few coral heads and reefs. The larger islets are covered with coconut palms, native trees, and undergrowth.

Fonua Fala (Fenua Fala) (9°23'S., 171°17'W.) is the W islet of the atoll. Lighters can enter the lagoon abreast Fakaofu village, about 1 mile SE of Fonua Fala, but the passage through the reef is hazardous. There is a small hospital on Fakaofu islet and an emergency seaplane landing area in the lagoon NE of the islet.

Tuvalu (Ellice Islands)

4.15 Tuvalu, formerly the Ellice Island group, became an independent state in 1978. It became part of the Republic of Kiribati in 1979. This group of islands lies between 5° and

10°S, and 176°E and 180°, extending about 360 miles in a NW-SE direction. It consists of nine atolls or clusters of islands, which are low and flat. The tops of the coconut trees are from 18 to 24m high.

Tides—Currents.—The N part of the group experiences a W set, as it lies within the South Equatorial Current. Currents in the S part of the group are variable.

Niulakita Island (Sophia Island) (10°45'S., 179°30'E.), the S island of the group, is a little higher than most of the group and thickly covered with trees. The island is surrounded by a fringing reef, and a bank, with a depth of 25.6m, extends about 1 mile off its shores. Depths of 14.6m extend about 0.5 mile from the shores of the island. Outside of 1 mile from the island, the depths increase rapidly.

Anchorage.—There is anchorage off the SW side of the island, in 12.8m, in a position defined by the left tangent of the island bearing 048°, and the right tangent bearing 077°. There is a good anchorage off the NW side of the island in depths of 13 to 21m, sand, about 0.5 mile from shore, with the E end of the island bearing 112° and the W end bearing 156°. A reef extends about 0.2 mile from the W extremity of the island.

Landing on the island is difficult in other than canoes. The landing place on the SW side of the island cannot be used in SE weather.

Caution.—Mariners without local knowledge should keep to the W of the island, as shoal water has been reported to extend up to 13 miles ESE of the island's E end. A bank, position doubtful, with a least depth of 25.5m, has been reported to lie 9 miles NE of the island.

4.16 Nukulailai (Nukulaelae) (9°22'S., 179°51'E.) comprises several islets located on a coral reef which surrounds a shallow lagoon.

It was reported (1993) that a 20m shoal lies 43 miles S of the atoll in position 10°09.5'N, 179°41.8'W.

Fangawa Island, lying on the W extremity of the reef, is 26m high and wooded. There is a mission station on this island.

Tides—Currents.—The flood current sets SSW and the ebb current sets N at the anchorage.

Anchorage.—There is precarious anchorage W of Fangawa Island, in 12.8m, 0.2 mile from the main reef. The bank on which to anchor is best found by eye from aloft, being easily seen with a good light. A vessel, 87m in length, has reported anchoring, in depths of 34 to 36m, with the N tangent of Fangawa Island bearing 047° and the S tangent bearing 110°. This position was found to be satisfactory in moderate to fresh E to SE winds.

Landing from boats is a very hazardous operation, except in calm weather with local knowledge, as even native canoes frequently capsize. There are two boat passages through the main reef. The passage off the W side of Fangawa Island is satisfactory during moderate to fresh E weather. During SE weather, a landing place off Matala, about 1 mile NNE of Fangawa Island, is preferable.

4.17 Funafuti Atoll (8°31'S., 179°08'E.) ([World Port Index No. 55617](#)), about 60 miles NW of Nukulailai, consists of a group of 30 islands and islets lying on reefs which encircle a lagoon. The lagoon contains numerous dangerous shoals and coral patches, several of which break heavily in the swell,

which sets in through the various passages. The lagoon is encumbered by numerous banks and coral clusters not generally visible if covered by more than 6m of water. Its W part is especially foul and is full of small coral patches rising steeply with deep water all around. In the deepest parts, there are depths up to 48m, sand and coral.

Winds—Weather.—The prevailing winds are E, with a N component from November to April and a S component from May to October. East to SW winds are steadier, but E to NE winds are slightly more frequent winds. Average winds are from 10 to 13 knots. The strongest gales occur in the season from November to April. Waterspouts are frequently seen in the area. The wet season is from December to March. September and October are the driest months. Squalls occur occasionally in the afternoons, but are of short duration.

Tides—Currents.—The spring rise within the lagoon is 1.8m, while the neap rise is 1.3m.

Currents within 7 or 8 miles of the atoll generally set W, but off the atoll's NE side the currents take a more N set. The current does not exceed rates of 0.75 knot, and is seldom more than 0.5 knot.

Tidal currents in the center of the lagoon are weak and irregular. Observations on currents were that in general, the tidal current flows along the axis of the channels. Maximum flood velocity of about 2 knots and maximum ebb velocity of about 1.6 knots may be expected.

Tidal currents in Te Ava I De Lape have an average maximum spring rate of 1.2 knots on the flood and 1.5 knots on the ebb. With NE winds, however, rates in the middle of the pass attain rates of 4 knots, with the ebb being the stronger. During SE winds, currents are less. In Te Puapua the flood sets W, the ebb SE, at rates of about 1 knot. The maximum current in Te Ava Fuagea is found to be 1.5 knots, this maximum coming at the springs on the ebb halfway between HW and LW. The current was usually under 1 knot. The current was not at anytime sufficient to interfere with navigation.

Depths—Limitations.—The largest vessel to have been handled was reported to be of 11,500 grt. Of the passes through the reefs, Te Ava I De Lape is the favored entrance, but has a depth of 5.8m (1985) on the bar. Te Ava Fuagea has a depth of 18.3m, but has a width of about 0.1 mile. From the pass to the wharf, the charted track has a least depth of 12.3m. Te Puapua has a least depth of 12.7m. The wharf, situated on the lagoon side of Funafuti islands, is L shaped and offers two berths. The outer face has a length of about 50m and alongside depths of 8m. The inner face has a length of 40m and an alongside depth of 5.5m. An offshore, multi-point mooring is situated off an oil tank just N of the wharf, but no information on depths at this berth are presently available.

Aspect.—Funafuti Island, the largest of the group, is located on the reef and is the only one of the group with permanent inhabitation. The whole island is densely covered with coconut palms and presents a very uniform appearance when seen from a distance.

The tanks, and a wreck situated 0.2 mile WNW of the wharf, are conspicuous. A church with a metal roof lies 1 mile SSE of the wharf. Several radio masts are charted on the seaward side of the island.

Pilotage.—Pilotage is compulsory and should be ordered in advance. Vessels should contact the port via radiotelephone,



Photo by Bob Girdo

Funafuti Wharf

standing offshore, and wait for advice. The pilot will board the vessel from a small boat as close off the pass entrance as is possible.

Anchorage.—Outside the barrier reef, anchorage is available on the lee side of the atoll. A vessel, 143m in length, with a draft of 7.6m, has reported anchoring, in a depth of 13m, between Fuafatu and Te Akau Fuafatu. The vessel reported the holding ground as good, and had also reported experiencing NE winds, force 3 to 6.

Anchorage may be taken on a bank located about 1.3 miles NNW of Tepuka, with the W end of the island bearing 153°, also with Te Afualiku and Paava in line bearing 071°. This berth offers convenient anchorage in E and SE winds.

Within the lagoon, anchorage is available NW, W, and SW of the village, but several reefs and shoals, some of which break, lie within 0.5 mile of the beach. Shelter here is reported to be moderately good, but vessels should use caution and a good scope of cable, as there are frequent heavy winds and rain squalls. A ground swell has also been reported here.

Caution.—Caution should be exercised when navigating within the vicinity of the passes, and within the lagoon due to the age of the survey. Uncharted shoals may exist off the recommended track, especially in the W portion of the lagoon. The aids to navigation marking the shoals within the lagoon have been reported to be unreliable or not in place.

4.18 Fatato Islet and Funangongo Islet (8°33'S., 179°10'E.), with a few coconut palms, lie on the reef which extends about 3 miles continuously SW from the SW extremity of Funafuti Island, at distances of about 0.6 mile and 1.8 miles, respectively, from that point.

Funamanu Islet, about 0.5 mile SW of Funangongo Islet, is covered with coconut palms and is marked close S of its W extremity by a beacon. A rocky spit, which does not always show well, extends about 0.2 mile SW from the W extremity of the islet.

Falefatu Island (8°35'S., 179°08'E.) is a narrow wooded island lying about 1 mile SW of Funamanu Islet. Reefs and shoals, with depths of less than 5.5m, extend nearly 0.3 mile off the NE and SW ends, and off the SE side of the island.

Mateika (8°36'S., 179°07'E.), the N extremity of which lies about 1.3 miles SW of Falefatu Island, is the northernmost of a chain of islets extending S to the S extremity of the atoll. These

islets are all wooded with coconut palms and show a very uniform outline. Motungie is the S islet of the group. Avalau is a small islet about 0.3 mile W of Motungie.

From **Avalau** (8°38'S., 179°05'E.) the reef, with several small wooden islets located on it, extends for about 2.3 miles in a N direction to **Tefala** (8°36'S., 179°05'E.). Tefala, a small islet on the reef forming the W side of the atoll, lies 1.75 miles W of the N extremity of Mateika. From Tefala, the reef extends NNW for 1.25 miles to Fuagea Islet, and then for 1.5 miles to Te Ava Fuagea passage.

Te Ava Fuagea (8°33'S., 179°04'E.) is a deep passage which was previously described in [paragraph 4.17](#).

Te Ava Fuagea passes between reefs, awash at extreme LW, while the reef bordering the N edge of the pass has boulders on it.

From seaward, and with local knowledge, proceed as safe navigation permits keeping a good lookout for reefs and the current. The pass has a least width of about 0.1 mile, and a least depth of 18m, while the track across the lagoon has a least reported depth of 12.3m.

4.19 Fuafatu (8°31'S., 179°03'E.), the W islet of the atoll, is located 5.5 miles N of Tefala and lies near the outer edge of the reef which projects W at this point.

Te Akau Fuafatu is a 5.5m coral patch lying 1 mile W of Fuafatu. It rises from a bank of sand and coral, with depths of 11 to 12.8m, which projects about 1 mile W from the reef. This bank drops very steeply down to the 200m curve. With any swell, the shoal breaks heavily and the bank on which it stands breaks occasionally. Fualopa and **Tepuka** (8°28'S., 179°06'E.) are two wooded islets lying 1.75 and 3 miles NE of Fuafatu. Te Afualiku is an islet about 1.8 miles N of Tepuka.

Pava Islet and **Fualifeke Islet** (8°26'S., 179°08'E.), about 1.3 and 1.5 miles ENE, respectively, of Te Afualiku Islet, are both wooded and nearly joined at LW by a sandy spit. The reef on which they lie partly dries, and extends about 0.5 mile WSW from Pava Islet.

Vessels, with a draft greater than 3m, wishing to navigate Te Paupau, should exercise extreme caution, as shoals with depths of less than 5m lie within 0.15 mile of the fairway. Banks, which were reported in 1972 to be extending, restrict the pass through the reef to a width of 0.1 mile. The fairway has a least reported depth of 12.7m, but passes over charted depths of 12.3m, 0.5 mile SW of the beacon on Funamanu.

When approaching the pass from seaward, the entrance should be identified visually, as the beacon on Funamanu is not conspicuous; also, the islands between Funamanu and Funafuti are not radar conspicuous. The beacon used as a steering mark (iron rail) should not be confused with a similar beacon situated about 0.5 mile SSE of it. This second beacon marks **Te Ulu Bungu** (8°33'N., 178°08'E.).

Te Ava I De Lape has a width of about 0.3 mile, a least depth of 5.8m, and is the most straightforward entrance for the lagoon. The channel passes between banks, with depths of less than 5m, which extend from coral reefs projecting from Te Afualeku, Pava, and Fualifekele.

From seaward, steer with the E end of the trees on Funangongo ahead bearing about 159.5°. When about 1.5 miles SSE of the pass, steer for the SE radio mast on Funafuti bearing 130°.

Caution.—The local authorities should be consulted for the latest information on depths, dangers, recommended tracks, and instructions before attempting to enter any of the channels mentioned above. The passes and lagoon require local knowledge.

4.20 Nukufetau Atoll (8°00'S., 178°20'E.) comprises a group of islets located on a reef about 48 miles NW of Funafuti Atoll. The atoll is roughly rectangular in shape, and contains some 30 islands and islets rising from a narrow coral reef. At LW, much of the reef is dry or barely awash. It is possible to walk between many of the islands and far out into the lagoon at LW. This group of islets forms a part of Tuvalu. All vessels discharge cargo to lighters. A wreck lies stranded on the reef, close W of the atoll's S island.

On **Savave Island** (8°02'S., 178°18'E.), one of a group of islands at the SW corner of the atoll, is a native village, the white buildings and flagstaff of which are visible from the sea. At the SE corner of the atoll is Motolalo Island, the largest of the chain.

The barrier reef on the NW side is broken by two passes, Teafua and Deafatule Pass. Teafua, entered about 1.8 miles NE of Savage Island, is used by vessels with local knowledge.

Tides—Currents.—A set, depending upon the state of the tide and the conditions of the weather, will generally be noted by vessels when approaching the seaward entrance of Teafua Pass. This set appears strongest on the ebb tide, when it usually sets South. A slight set to N may be expected inside the lagoon near the inner entrance of the pass. The current in the pass follows the general axis of the channel, and flows at rates of 1 to 3 knots. Caution is advised as at the turn of the tide, tide rips form, rendering the pass dangerous.

Anchorage.—The lagoon affords good anchorage in many places, but the channel leading to the anchorages NE of Savage Island is intricate.

Directions.—**Teafua Pass** (8°00'S., 178°20'E.) has been swept to a depth of 4.9m. It lies between the reefs which surround Sand Islet and **Entrance Islet** (7°59'S., 178°20'E.), lying about 1.3 and 2.5 miles NNE, respectively, of Savave Island. The pass is unmarked, but a white beacon on **Vasamotu Islet** (8°02'S., 178°23'E.), on the E side of the lagoon, bearing 120°, leads through the center of the channel; in 1984, the beacon was reported to be missing. This beacon is useful, as the shoal water on either side of the bearing indicated is not very obvious.

Caution.—Vessels approaching Nuku Fetau should be careful to keep seaward of the shoal area extending about 1 mile WSW from the SW end of the atoll. The approach to Teafua Pass should be made from a position at least 1.3 miles seaward of the entrance. Local knowledge is required in passing through the channel.

4.21 Vaitupu Island (7°28'S., 178°41'E.), 32 miles NNE of Nuku Fetau, is densely wooded and surrounded by a fringing reef. The island has lagoons, the larger located in the SE part. There are two entrances to the larger lagoon, one of which is practicable for boats at HW. The larger lagoon is surrounded by a belt of coconut trees, 18m high. Landing is difficult and is best effected in native canoes.

The principal village of the island is situated near its S end, to the SW of the large lagoon. A church at the village is conspicuous between NE and ESE bearings.

There is a passage through the reef abreast this village. The seaward end of the passage is in line bearing 060° with the church. This passage can be used by ship's boats at HW only and in a flat calm.

Anchorage.—In 1961, a vessel found anchorage with the church bearing 100°, distance about 0.4 mile. In 1984, a vessel reported being unable to find anchorage off the island's W side.

4.22 Nui Atoll (7°16'S., 177°10'E.), lying about 90 miles W of Vaitupu, is in the form of a crescent, with an island 18m high at each end. A chain of 14 islets extends between the islands along the E portion of the reef.

The S island, which is inhabited, is approachable by a boat channel into the lagoon. The channel, which is impassable by canoes at LW, is entered with a flagstaff on the S island bearing 077°. In 1979, the channel was reported to have been widened, while in 1984, the flagstaff was missing.

The W side of the atoll is steep-to and offers no anchorage. In 1984, a small vessel reported anchoring off the N lip of the N island.

Niutao (6°06'S., 177°16'E.), 68 miles N of Nui, is about 1.3 miles across, nearly round, and densely covered with coconut trees. A narrow fringing reef extends all the way around the island, on which a heavy surf breaks, rendering landing difficult except for canoes. There is no passage into the lagoon. A village is situated on the SW side of the island.

Tides—Currents.—A vessel has experienced a strong S set between Nuku Fetau and this island.

Anchorage.—Anchorage can be found, in a depth of 31.1m, off the W end of the island, about 90m from the reef. There is a similar anchorage off the E end of the island for use in W winds.

The best landing place is close N of the W extremity of the island.

Nanumanga (6°18'S., 176°21'E.) is a low coral island surrounded by a narrow fringing reef with an unusually precipitous face to seaward. The island is wooded with coconut palms about 24m high.

Reefs extend nearly 0.4 mile from the N and S points of the island, which is about 1.5 miles long and 0.8 mile wide. The surf breaks heavily over the reefs.

There is a village on the W side and native missionaries are established. A flagstaff and a church stand on the W side.

There is no anchorage or lagoon and landing is difficult.

Caution.—A shoal patch, with a least depth of 11.3m, is located about 2.5 miles NNE of the N extremity of Nanumanga. The patch provides a useful anchorage for visiting ships, but there is no shelter and the ocean swell tends to be more pronounced.

4.23 Nanumea (5°39'S., 176°08'E.), 37 miles NNW of Nanumanga and the N atoll of the Tuvalu group, consists of a coral reef, with two principal islets, Lakina and Nanumea, about 0.5 mile within its W and SE extremities, respectively, with a lagoon between them. There is no channel for deep-draft vessels into the lagoon. A small boat channel, available to

boats at HW, leads W of the W arm of Nanumea into the lagoon. There is a village on the W side of Nanumea with a conspicuous red-roofed church bearing between 020° and 120°, off which extends a broad fringing reef which rises as a wall of coral from the depths of the ocean. The sea breaks furiously on this reef, but at intervals the surf subsides to the extent that boats may land. Reefs extend off the SE point of Nanumea. It has been reported that a pier, 82m in length, extends from the village, and that two other piers exist in the lagoon.

Vessels approach Nanumea from the W and lie off this islet, discharging cargo into landing craft. The bend in the atoll affords a slight lee off the NW arm of Nanumea. Large landing craft beach and unload on the reef; they should come in 3 hours before LW and can remain until 3 hours after LW. Engines should be kept running to keep the stern from swinging.

Anchorage.—A vessel anchored off the NW point of Lakina on a submerged coral patch, about 0.3 mile off the dry fringe reef, in 12m. The anchor was dropped 0.5 mile from the NW tangent of Lakina, with the tree line bearing 145°.

Caution.—Vessels passing N or S of Nanumea should give it a wide berth. The fringing coral reef is extremely hard and will break the back of any ship swept across it. The coral fingers extending from the reef also present a hazard.

The Gilbert Islands

4.24 The Gilbert Islands lie N of the Tuvalu group and extend from 2°45'S to 3°30'N, and between 172°30'E and 177°00'E. Some of these islands are incorrectly placed on the chart, particularly as to longitude. Those islands of the Gilbert group that lie N of the Equator are known as the North Gilbert Islands; those S of the Equator are known as the South Gilbert Islands.

The E side of these islands are steep-to and may be passed at 0.5 to 1 mile off. The W side are fronted by sunken reefs, spits, and coral patches which in some cases extend many miles off. It is advisable to pass E of the islands, but care must be taken not to be set too close inshore by the prevailing E wind and the South Equatorial Current, which generally sets W. Vessels are urged to contact the Marine Superintendent at Beito, Tarawa for the latest navigational information on buoys, beacons, etc., before entering or approaching.

Tides—Currents.—The islands in this group are almost always influenced by the South Equatorial Current, which sets to the W at rates of 1.5 to 2 knots. Persistent W winds, which may occur from December to April, or a S shift of the South Equatorial Countercurrent may cause an E set.

Caution.—Fish Aggregating Devices (FADS) have been placed within the waters of the Gilbert Islands in the following approximate positions:

- a. 3°08.1'N, 172°41.2'E.
- b. 1°23.2'N, 173°10.6'E.
- c. 1°10.0'N, 173°01.0'E.

FADS are usually moored in deep water locations; they may be lit or unlit, and concentration of fishing vessels may be encountered in the vicinity. FADS are not an aid to navigation nor are they maintained as such; they are subject to break loose from their mooring grounds.

In 1983, breakers and discolored water reported in positions 3°53'S, 174°02'E and 2°21'S, 175°19'E.

Arorae (2°39'S., 176°50'E.), the SE island of the Gilbert Islands, lies about 185 miles NNE of Nanumea, in the Tuvalu group; it is densely wooded and about 15m high to the tops of the trees.

A reef, which always breaks heavily, extends 0.3 mile S from the island. A coral and sand reef, with depths of 3.6 to 7.3m, extends about 2 miles from the NW point of the island. On the latter reef, which is dangerous, a heavy ground swell usually runs and occasionally breaks heavily at more than 1 mile offshore.

There is a concrete church on the island, but it is obscured by trees from the N and S. The flagstaff at the government station shows above the trees midway along the W side. The island is best approached from the W, steering for the flagstaff.

Anchorage.—The best anchorage is on the W side of the island, immediately in front of the church. It has no swinging room and is practicable only when there are N and S winds.

A vessel found an anchorage (1949) in 23.8m, with the flagstaff bearing 001° and the N of four coconut palms, painted white, on the foreshore, bearing 067.5°.

Directions.—Landing is accomplished from canoes at the beach in an area, to the W of the flagpole, where all projecting coral heads have been cleared for a distance of about 0.2 mile. The reef extends out for about 0.2 mile in the area.

4.25 Tamana (2°29'S., 175°54'E.), located about 50 miles W of Arorae, is densely covered with coconut trees and is fringed by a coastal reef about 0.2 mile wide. There are no navigational marks on the island, except for a conspicuous white church and a flagstaff about 90m SE of it. The church is situated about midway along the SW side of the island, close to the beach. An administration building stands close S of the church.

There are no anchorages off the island, except for small vessels with local knowledge.

There are depths of over 200m about 0.1 mile from the breakers, except at the N and S extremities of the island, where the slope of the seabed is less steep.

A boat channel, suitable only for canoes or surfboats, has been blasted through the reef opposite the flagstaff. The channel, which is about 4.8m wide, is approached with the flagstaff bearing 041°.

Caution.—Off-lying banks, with depths of 92 to 366m, lies in approximately 3°01'30"S, 175°41'12"E, about 35 miles SW of Tamana. In 1983, a vessel reported breakers in approximate positions 3°53.0'S, 174°02.5'E and 2°21'S, 175°19'E.

4.26 Onotoa (1°51'S., 175°35'E.) lies about 41 miles NW of Tamana and has a shallow lagoon bordered by a broken reef on the W side. The lagoon is studded with numerous coral heads. At LW, it is possible to walk all the way around the islands in the lagoon. There are two boat channels leading through the reef. The N channel S of **Temuah Island** (1°47'S., 175°29'E.) leads to the jetty on the W side of Tanyah Island, the N island. It has been reported that the N channel is hazardous. The S channel, N of the SW island, leads to the lagoon and the village on the S island. The tidal rise is about 1.8m. There is a conspicuous stone beacon with a white top on Temuah Island, at the NW extremity of the atoll.

Anchorage.—The principal anchorage is off the N boat passage, about 1 mile S of Temuah Island, in depths of 11 to 12.8m, with Temuah Beacon bearing 000° and the S extremity of Tanyah Island bearing 107°.

Large vessels can anchor about 0.3 mile W of the latter anchorage, in 18 to 21m, where there is plenty of swinging room.

Landing can be effected at the coral rock jetty on Tanyah Island at all tides.

4.27 Beru (1°20'S., 176°00'E.), about 37 miles NE of Onotoa, is surrounded by a reef and has a small lagoon on its W side. Coconut palms cover Beru. Near the center of the island, the reef extends about 2.5 miles W. It extends about 0.3 mile from the SE point and always breaks. Beyond the edge of the reef is a spit extending 0.5 mile E, with depths of 7.3 to 21.9m.

There is a boat channel through the reef abreast the NW point of the island. A boat passage lies about 0.5 mile N of the SW corner of the barrier reef. The reef off the NW end of the island has a depth of about 1.8m at HW, when it can be crossed by boats.

Anchorage.—There is anchorage, in a depth of 14.6m, coral, close to the reef abreast a trading station at the southernmost village. It can be used only in good weather with winds between the N and E.

Espiegle Anchorage is abreast the mission buildings off the W side of the atoll. Anchorage is available, in depths of 10.9 to 51m, with the NW extremity of the island bearing 342°, and the SW extremity bearing 114°.

Directions.—The best landing is about 4 miles from the S extremity of the island, on the central inner reef, opposite a church and the trading station.

4.28 Nikunau (1°23'S., 176°26'E.), located about 23 miles E of Beru, is of coral formation and surrounded by a reef. The seaward edge of the reef drops away rapidly into deep depths. There are breakers all around Nikunau. A shoal, with a depth of 6.7m about 0.5 mile from shore, extends from its S point. A narrow spit, with depths of less than 16.4m, extends SE for about 1.5 miles from the SE end of the island. A spit, with a depth of 6.7m at its seaward extremity, extends about 0.5 mile W from the NW end of the island. The island is 1.8 to 2.4m high and thickly covered with coconut and pandanus trees. All the villages are on the W coast.

Anchorage.—There are no suitable anchorages for large vessels. In 1959, a vessel anchored off Rungata village (near the center), just over 0.1 mile clear of the reef, in a depth of 69.5m. From the anchorage the flagstaff bore 107°, the white Mission building bore 061°, and the spire of the Roman Catholic church bore 021°. The anchorage is unsafe in a W wind.

Directions.—There is a landing at Rungata through a boat passage which has been blasted through the reef. The passage is located opposite a point on the shore just N of the prominent white Mission building. Landing may also be effected over the reef on a stretch of sandy beach fronting a large native building in a cleared space about 1.5 miles N of the S point of the island.

4.29 Tabiteuea (1°33'S., 175°02'E.), the largest atoll of the Kiribati Islands, lies about 31 miles NW of Onotoa and is about 32 miles long. It consists of a chain of islets, lying in a NW-SE direction, thinly covered with trees. At the S end of the atoll is a lagoon, enclosed on its N and E sides by islets, and on its S side by a drying reef. The W side of the lagoon is also closed by a barrier reef extending out about 5 miles. The lagoon depths are from 3.7 to 9.1m.

There is a ship passage into the S lagoon. West Passage, about 13.5 miles, bearing 254° from the N extremity of **Buariki** (1°28'S., 175°04'E.), should not be attempted by a vessel drawing over 3m. Local knowledge is necessary for the use of this passage.

Eanikai (1°10'S., 174°43'E.), the N island of the atoll, has several mission stations and villages. A beacon, 18m high, and a flagstaff are useful landmarks on the island.

Nautilus Shoal (1°34'S., 174°55'E.) is reported to lie 7 miles WSW of the SE extremity of Buariki, the E island of the atoll. Depths of the shoal are from 9.1 to 21.9m, and are reported to be connected to the reef by foul ground.

A dark brown rock, called The Breaker, lies in about 1°29'S., 174°51'E. This rock is awash at LW and almost always breaks. Two drying coral patches lie about 0.2 mile E and 0.3 mile ESE of this rock.

Shoal water and breakers were sighted by a ship (1966) at a position about 12 miles S of Tabiteuea.

Nautilus Shoal and its adjacent foul ground should be given a berth of at least 15 miles and no attempt should be made to approach the anchorage unless the sun is high enough and far enough astern to navigate through the coral by eye. Continuous sounding is necessary.

Strong tide rips off the NW side of the atoll appear as surf from a distance.

Anchorage.—There is anchorage, in 14.6m, sand and coral, off the boat passage which lies 2 miles W of **Umai Ataei** (1°33'S., 175°00'E.), the S islet, with the islet bearing 085°. A vessel anchored, in 29.3m, with the beacon SW of Utiroa village bearing 052°. This anchorage appeared to be good, but there were several light-colored patches in the vicinity.

Peacock Anchorage, which lies outside the shore reef, is a bank of coral and sand upon which there is anchorage, in depths of 9.1 to 21.9m. It is W of Eanikai, the N island. Great care must be taken in anchoring here, as the water shoals rapidly from depths of 45.7m. This anchorage is obstructed by reefs and coral heads. Landing from Peacock Anchorage in moderate weather is fair.

4.30 Nonouti (0°40'S., 174°27'E.) lies about 24 miles NW of the N end of Tabiteuea. The islets of which it is composed are nearly continuous on the N and E sides, being connected by coral reefs. The atoll is partially covered with trees. A reef extends 1.5 miles W of the N point of the atoll and then S for about 9 miles to Archer Entrance.

An intricate passage, which leads from Archer Entrance through the lagoon, is available, reportedly to vessels up to 55m in length, with drafts of 4.5m, but requires extensive local knowledge.

Tides—Currents.—Outside the lagoon, the tidal currents follow the trend of the reef, the flood setting N and the ebb S, at

velocities of 1.5 to 2.5 knots. The currents turn about 1 hour after HW and LW.

Aspect.—A conspicuous church, with metal-roofed buildings close N and S of it, stands at **Umantewena** (0°44'S., 174°28'E.), while prominent churches stand in villages 1 mile and 3.5 miles N of Umantewena. **Numatong** (0°36'S., 174°13'E.), an island standing on the NW reef, is conspicuous from a vessel off the W reef. When approaching Archer Entrance from the N, vessels should give Numatong a berth of at least 5 miles to clear the spit extending W from it.

There is a good landing at Kairaoa, about 0.4 mile SSE of Temaraia.

Anchorage.—Outside the lagoon, anchorage is available in Archer Entrance, with a beacon (0°40.9'S., 174°20.9'E.) bearing 075°, 4 miles distant. Southwest Anchorage has depths of 31m E of **Autaken Reef** (0°44'S., 174°23'E.). Vessels anchor with the mission at Umantewena a little over 3 miles distant, bearing 020°. Close NW of the anchorage there are two boat passages into the atoll, the N one being preferred.

Anchorage within the lagoon requires local knowledge.

Caution.—Autaken Reef, on the SW side of the atoll, is nearly awash, steep-to, and always shows well. **Autaken Spit** (0°47'S., 174°20'E.) extends about 2 miles in a SW direction from Autaken Reef. It is light in color, very shoal, and easily distinguished.

From the spit, the sunken reef extends NNW for about 6 miles to Archer Entrance. On this reef are numerous small pinnacle coral heads known locally as "horse's heads," which are difficult to see and make it necessary to avoid this part of the reef.

4.31 Aranuka (0°08'N., 173°37'E.), S point, lies about 56 miles NW of the N extremity of Nonouti. It consists of two wooded islets lying on a reef enclosing a shallow lagoon. The islets appear to be connected in a continuous string by low, sandy beaches, with a boat passage on the SW side of the atoll.

A reef and dangerous ground extend about 4 miles WNW from the W extremity of the W islet, and for a distance of up to 2 miles off the N side of the atoll.

Anchorage.—Anchorage is reported on the reef extending out to the W and N, but there is considerable swell. There is also anchorage, in depths of 14.6 to 18.3m, coral, from 0.1 to 0.3 mile from the reef close S of the boat passage on the SW side.

Caution.—The boat passage is available in moderate weather from half-flood to half-ebb tide. There are several obstructions in it and the currents are strong, rendering the passage dangerous.

4.32 Kuria (0°13'N., 173°24'E.), an island about 6.8 miles WNW of Aranuka Atoll, is divided into two parts near the middle, the N of which is known as Oneaka. The island is densely wooded and covered with palm trees, 21m high. A fringing reef surrounds the island. An unsurveyed spit, on which the sea usually breaks, extends about 5 miles NW from the N extremity of Oneaka. Depths of 9 to 17m are located 1 mile and 1.3 miles E, respectively, from the E extremity of Kuria.

Tides—Currents.—In June, the current was observed to set W with a velocity of 2 knots. Near the coast the tidal current changes with the tide.

Anchorage.—There is an anchorage off the W side of Kuria, in a depth of 27.4m, on the edge of a shelf.

Caution.—Mariners are cautioned to give the SE extremity of Kuria a wide berth, as this area is unsurveyed and contains shoal water. A large reef extends to the E from about the midpoint of the island.

The boat passage over the reef cannot be used within 1 hour of LW.

4.33 Abemama Atoll (Hopper Atoll) (0°21'N., 173°51'E.) lies about 23 miles ENE of Kuria, with an almost continuous chain of islands on the N and E sides of the lagoon. There are no off-lying dangers reported anywhere near Abemama Atoll, and vessels may circumnavigate it in safety by keeping about 1 mile off the breakers. There are depths of 200m close to the edge of the reef surrounding the atoll, making outside anchorage dangerous. There are two passes into the lagoon; the **Western Passage** (0°24'N., 173°47'E.) and South Passage. Vessels are urged to contact the Marine Superintendent at Tarawa for the latest information on the depths and aids to navigation marking the channels of this atoll.

Tides—Currents.—In the lagoon passes, the current is tidal. In Western Passage, which is shallow, the tidal current runs about 2.5 knots at springs. A considerable ground swell runs occasionally at the entrance to this channel. Through South Passage, which is narrower and deeper, the current may often obtain a rate of 4 knots during springs. A strong tidal current is reported setting approximately along the axis of that portion of the channel lying SW of Henson Rocks. Tide rips are noticeable and, at ebb tide, often give the appearance of reefs.

A report states that the general set at Abemama is 260°, with a drift of 1.6 knots. The current divides at the SE part of the atoll, and follows the reef N and S. The current 0.9 mile off the reef was observed to be 0.3 knot, setting parallel to the reef on the E beach. Along the N beach the drift was 2 knots. Eddy currents exist off the NW beach, the set being S with a velocity of 1.5 knots. Here again, because of the tidal effect of the lagoon, the currents have rips and are not predictable.

Aspect.—Bike Island (Entrance Island) (0°22'N., 173°52'E.) is located about midway along the SW side of the atoll. The remains of a wreck lies on its SE side. Foul ground extends for over 0.35 mile off the NW side, and 0.8 mile off the N end of the island. Part of this foul ground consists of a sand-spit which is defined and shows up almost white. At LW, the spit is awash at its extreme end.

Henson Rocks, a group of rocky shoal patches with depths of 3.4m, lie on the N side of the main channel, about 0.9 mile NNE of the N end of Bike Island. These rocks are sometimes difficult to distinguish, especially at ebb tides, when the water is much discolored. Caution is necessary in navigating the channel due to adjacent shoals and strong currents.

Anchorage.—Vessels should anchor in the entrance to these passages midway between the reefs in depths of about 9.1m. Western Passage is more favorable as the currents are not so strong. Anchorage may also be taken in good weather just to the W of the N end of the atoll.

A large number of vessels, necessarily limited in size by the depths of the entrance channels, can obtain sheltered anchorage in the lagoon. The holding ground is said to be excellent, consisting of fine coral sand with almost a clay-like consistency.

Directions.—Western Passage, with a least depth of 3.4m in the center and entered about 2.5 miles N of **Abatiku Island** (0°24'N., 173°46'E.), gives access to difficult waters. It should not be used by vessels drawing over 3.6m, and then only with local knowledge. The entrance, which is about 0.5 mile wide, can be picked up from seaward as a gap in the line of breakers. The S side of the channel is bounded by a foul area of coral heads and boulders. Vessels drawing more than 3.4m should keep to the N side of the passage, where a least depth of 4.2m can be carried. Keep the barrel buoy, moored about 3 miles NE of the E tip of Abatiku Island, on a suitable bearing ahead to stay in the N side of the passage. Unless the position of the buoy has been recently checked, vessels drawing from 3.6 to 4.6m are advised not to enter the passage except near HWS. Inside the entrance, the channel leads in a general NE direction to the finger pier, and is marked by buoys and beacons.

South Passage is entered on the SW side of the atoll NW of Bike Island. The channel is about 0.3 mile wide at its outer end, but narrows and becomes tortuous inside. A sandspit on the S side and shoals on the lagoon side of the entrance narrows the channel to less than 0.1 mile.

A set of range beacons, in alignment bearing 042° marks part of the passage through the entrance.

4.34 Maiana (1°00'N., 173°01'E.) is an atoll of quadrilateral shape, 9 miles long in a NE-SW direction, and 6 miles wide. The E side of the atoll forms one continuous island; the W side is formed by a reef, awash, the position and extent of which, especially W, has not been accurately determined. There are many dangers in the lagoon which is shallow and has not been surveyed.

A boat passage, which dries 0.3m, leads through the reef near the N extremity of the atoll to the island of **Tebikerei** (1°00'N., 173°01'E.), on which there is a village. The passage is marked by "perches" standing in piles of stones which cover at HW. A shoal, with a depth of 3.7m, lies about 0.5 mile WNW of the entrance to this boat passage.

The deepest boat passage with reported depths of 1.8 to 5.5m, lies about 7 miles SW of the N extremity of the island. This passage, marked by perches, is used by small craft going to the government station on the SE side of the lagoon. There is a pier here; a flagstaff stands close E.

Tides—Currents.—There is a strong indraft on the NE side of the atoll. The island, Maiana, is almost always influenced by the South Equatorial Current, with a W set at a rate of 1.5 to 2 knots. Persistent W winds which can occur between December and April may cause E sets.

Anchorage.—Anchorage may be obtained on the edge of the shelf, in a depth of about 23.8m, about 0.2 mile W of the 3.7m shoal off the entrance of the N boat passage. Anchorage may also be obtained on the edge of the shelf, in a depth of 7.3m, about 2 miles NW of the boat channel situated about 7 miles SW of the N extremity of the island.

Caution.—The W sides of the atoll are dangerous and must be approached with caution as the sea seldom breaks over the

reef, and the discoloration of the water is not always discernible.

Tarawa Atoll (1°30'N., 173°00'E.)

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4.35 Tarawa Atoll is located about 18 miles N of Maiana, and consists of a chain of long narrow islets located on a right triangular shaped reef. The E and longest side and the S side have islets along their whole length. The W side of the atoll is submerged, with depths of 3.7 to 18.3m over the reef, except for about 6 miles from the N extremity of the apex, where it is above water. There are no off-lying dangers reported near Tarawa. However, vessels should give the extremities of the atoll a wide berth. The islands are partially wooded with groves of coconut trees, except for Betio and Bairiki at the S extremity of the atoll, which are covered with dense undergrowth. Masthead navigation is necessary when navigating around the atolls. It has been reported that when in the vicinity of Tarawa and approaching land at night, a lookout at deck level normally sights land before those stationed at higher levels.

Tarawa is the port of entry for the Republic of Kitibari and the administrative center. The port and commercial center is at Betio Island and the government offices on Bairiki Island, 2 miles E. The harbormaster's office is situated below the radio tower in Betio.

Winds—Weather.—The Southeast Trade season extends from March to November. It is characterized by more or less steady trade winds blowing from ESE and little rainfall. There is no actual doldrum period and no definite time of calms and squalls, although calms and cat's paws do occur quite often in June and July.

The average wind force during the day is about 12 knots, but occasionally a good fresh trade will blow up to 30 knots. After sunset the wind will fall to 3 to 6 knots, freshening again in the morning about 3 hours after sunrise. Occasionally, a fresh breeze or squall will be experienced in the morning or evening.

The westerly season extends from November to March, or more precisely, westerlies very seldom occur before the beginning of November or after the end of March. It is not certain that a westerly will occur in any one year during these months, but there have been exceptional cases in which westerlies have lasted throughout the entire year. In these exceptional cases, gales do not occur, winds are light, and the atmosphere is sultry. Such an unusual year might be encountered once in every decade.

There is some variation in the trades between the N and S Gilberts. In the N group, consisting of Apiang, the N part of Tarawa, Marakei, Butaritari Atoll (Makin Atoll), and Little Makin, the islands come under the influence of the Northeast Trades at certain times of the year. Apparently the border line of the trades is along this belt. In the S group the trades blow ESE, while in the N group from the E to just a little SE. In the westerly season, winds in the N group will blow ENE, with an occasional NE squall.

The westerly gales usually give 24 to 36 hours notice of their approach. The first indication is a bank of high cirrus working up slowly from the W. This is followed by a coppery haze in the afternoon, and a swell from the W. When these

phenomena are observed it is fairly definite that a westerly gale will hit the island group within 36 hours.

The gale itself is heralded by a low bank of dark, nimbus clouds approaching on the W horizon, usually in the form of a horseshoe. The gale comes up fairly fast, and breaks with thunder, lightning, heavy rain, and a rush of wind. The gale may attain a rate of 50 miles per hour, and in localized instances in excess of 60 miles per hour. A very violent gale may last only 5 or 6 hours, but usually it is 3 days before the wind subsides. The wind then starts chopping from the SW and NW. The sky breaks, the wind and swell subside, and within 24 hours normal conditions return.

The "line island" squall, which is also encountered in these waters, is not to be confused with the westerly gale. These squalls may occur in any season and generally strike toward sunset. Their approach is often heralded by a cloud banking up among the trade wind clouds to windward. This cloud then spreads and forms a dark horseshoe bend on the horizon. Heavy rain and a very strong gust of wind follows with a force of about 50 miles per hour at the heart of the squall. The squall may last for an hour, or perhaps an hour and a half, but it has no lasting effect, and good weather soon follows.

The climate in the Gilberts is warm to hot, and drier in the S part of the group than in the N. Except on calm days, which are somewhat oppressive, the heat is tempered by the trade winds. The nights are cool and pleasant.

Tides—Currents.—The mean tidal rise is 1.3m, while the spring rise is 1.9m.

The maximum tidal current observed in the entrance channel was 1.2 knots, setting 282° on ebb tide. The maximum velocity observed on flood tide was 0.8 knots, setting 120°. The current may be slightly greater during maximum spring tides or unfavorable weather outside. It has been reported that tidal currents in the entrance channel have been known to flow athwart the fairway.

The SE extremity of Tarawa should be given a wide berth, as a strong current splits off this point, one part flowing W and the other N.

The currents along the E approach to Tarawa have a set to the NW of about 2.5 knots. To the N and S of the atoll this set increases from 3 to 3.5 knots. On the W side it drops back to 2.5 knots and is unpredictable.

Following westerly gales the currents may reverse and flow to the E for 2 or 3 days before returning to their normal path.

Between Tarawa and Abaiang Atoll, about 6 miles N, an E countercurrent occasionally runs, the average rate being 1 knot. It may be experienced at any time of the year. During June and July, the countercurrent is sometimes felt as far S as Nonouti.

Depths—Limitations.—Vessels with a depth of 7.3m can enter the lagoon at any stage of the tide, while drafts of 9.1m may enter at HW. Cargo is normally worked by lighter.

Betio Harbor is formed by two moles and has a depth of 1.8m at LW.

Tank vessels, with drafts up to 4m, normally anchor off the E mole, Med-moor, and discharge to floating hoses.

A jetty projects 150m NNE from the head of E mole. A wharf, operating four berthing faces 50 to 70m long, has a least depth of 5m alongside.

Aspect.—The NE side of the atoll is over 19 miles long and contains numerous other long, narrow islands lying on the reef.

The W side of Tarawa Atoll consists mainly of submerged reefs lying near the N end, and Betio Island, about 16 miles S. The main passage into the lagoon is entered on this side, about 3.3 miles N of Betio Island. Tarawa Lagoon is extensive in area, but it contains numerous shoals and coral heads in its N and E parts. The lagoon is moderately sheltered, except from the W and NW. Between Betio Island and the SE extremity of the atoll, about 13 miles E, there are several long, narrow islands lying on the coral reef. This reef mostly dries at LWS.

The water in Tarawa Lagoon always carries small particles of coral in suspension. This cuts down underwater visibility greatly. Shoals and coral heads in depths of water that would in most lagoons permit their being seen with ease are invisible here.

Four radio masts stand on the W end of Betio Island, while another pair stand 5 miles ESE of the first group. Lights are shown from several locations within the lagoon.

Pilotage.—Pilotage is not compulsory, but is recommended, and is available in daylight only. Pilots should be ordered at least 48 hours in advance, confirming 24 hours prior to arrival. The boarding ground is about 1 mile W of Entrance Buoy No. 1 (1°24'N., 172°55'E.). The IALA Maritime Buoyage System (Region A) had been adopted in 1985 for Betio Lagoon.

In 1989, it was reported several buoys and beacons in the approaches were missing or temporarily replaced by drums or other marks.

Signals.—The local authorities may be contacted via radiotelephone, while the pilot may be reached via VHF channels 12 and 16. The port radio station in Betio has limited communication ability, operating only on 6215.5 kHz and on VHF channel 16.

Anchorage.—Beyond the reef, W of Betio, there is reported to be a good anchorage. Vessels over 9.1m draft should anchor, in 27 to 36.6m, outside the reef near the entrance channel.

In 1987, a good anchorage was reported, by a vessel drawing 5.6m, to lie 2.3miles E of Betio harbor entrance, in depths of over 11m.

Vessels may anchor almost anywhere along the lee side of the atoll, but it is advisable to bring it up soon after striking soundings, as in places, especially S of the main passage and toward the N end of the atoll, the bottom shoals quickly and becomes foul.

The principal anchorage is off Betio Island, where a vessel drawing up to 9.1m can anchor 0.65 mile, bearing 029° from Betio boat harbor light. A cable area in which anchorage is prohibited extends off the docks at Betio.

Directions.—Vessels should approach Tarawa Atoll from at least 2 miles to seaward of the entrance buoys, then head 109° for Bikeman Island beacon and pass through the entrance. To avoid passing shoals in the vicinity of buoys No. 1 and No. 2, a vessel should keep to the port-side of the track, about 0.1 mile. When No. 3 buoy is abeam to starboard, course should be altered to bring Bairiki Island beacon in line bearing 150° with the beacon marking Vinstra Shoal. Vessels should then follow the track depicted on the chart.

Caution.—Vinstra Shoal, with a depth of about 2m and marked by a beacon, lies about 2.2 miles NNE of the W extremity of Betio Island.

4.36 Abaiang Atoll lies about 6 miles N of Tarawa. The land along its E side is continuous and wooded. On the NW side of the atoll there are several islands. **Ribona Island** (1°58'N., 172°52'E.) is the N, with **Nanikirata Island** (1°54'N., 172°47'E.) being at the W extremity, formed by a drying reef on which are several sandbanks. Between the latter island and **Bolton Point** (1°43'N., 172°59'E.), the SW point of the atoll, the W side of the atoll is formed by a broken drying reef on which there are several islets. There are several boat passages on the SW side of the atoll.

Bingham Channel (1°45'N., 172°58'E.), the main ship channel, lies about 2.3 miles NW of Bolton Point. The entrance is about 0.3 mile wide, with a least depth of 2.7m about 0.2 mile within the entrance (1969). There are overfalls on both sides of the entrance. Within the lagoon, which is only partly surveyed, there are numerous shoals and drying reefs. There is a depth of 3.6m in the channel inside the lagoon. Beacons mark the channel to the anchorages off the villages.

Anchorage.—There are no safe anchorages for large vessels off Abaiang Atoll. Inside the lagoon, anchorage may be obtained, in a depth of 6.4m, about 0.5 mile SW of **Taburao** (1°49'N., 173°01'E.) flagstaff. Small coasters and copra vessels anchor off all the main villages. Landing can best be made at HW, when small boats can beach.

Navigation within the lagoon is not recommended before 0800 or after 1600, or when the sky is overcast, since the reefs are not then clearly visible.

4.37 Marakei (2°01'N., 173°20'E.), in two parts, is an atoll located about 17 miles NE of Abaiang, and contains a deep lagoon which is entirely landlocked at LW. From seaward, the island has the appearance of being land only. The island is 1.8 to 3m high and is densely covered with coconut palms about 24m high. There are two passages which give access to the lagoon at HW. One is on the E side of the atoll, and the other on the W, with gaps in the trees being the only indication. The E side is foul and is not used, but the W side, about 1 mile N of the SW point, can be used only by boats and is crossed by a bridge.

There are several villages on the island, the main one being Rawanawi on the W side, about 0.8 mile S of the N extremity. A white church here is conspicuous, with a flagstaff standing about 0.3 mile S of it. The shore reef at the N end of the island extends NW for about 0.5 mile and always breaks.

Tides—Currents.—Along the W side of the island the flood current sets N and the ebb sets S.

Anchorage.—The principal anchorage is off the village of Rawanawi, in 18m, with the church steeple bearing 119° and the N end of the island bearing 051°. During the N swells, from November to March, the anchorages are not tenable.

4.38 Butaritari Atoll (Makin Atoll) (3°05'N., 172°50'E.) ([World Port Index No. 56440](#)) lies about 64 miles N of Abaiang Atoll. The major facilities are situated on Butaritari Island, at the SW part of the lagoon. There are two trading stations at Butaritari Island; at the SW station are the remains of On Chongs Wharf and about 0.5 mile NE is Kings Wharf. About 0.4 mile NE of Kings Wharf are the ruins of a church, 0.1 mile N of which is a short, stone pier, and about 0.6 mile NE of the

latter are the remains of a government pier. All supplies are brought ashore by barge. There are beaches used by landing craft.

Winds—Weather.—As the atoll lies between the NE and SE trades, the winds are more variable than in the S groups of islands. Generally, the wind is from the ENE, force 4. Occasionally, strong NE winds of force 5 to 6 are experienced. They are usually accompanied by short, fierce squalls, with rain. Calms and sultry conditions occur in June or July. Occasionally, thunderstorms may occur at any time of the year. The westerlies are, as in the rest of the group, gales up to force 7 lasting from 3 to 7 days.

Tides—Currents.—The mean tidal range is 1.3m, while the spring rise is 1.8m.

The Equatorial Current usually sets to the W and WSW in force, but occasionally, a countercurrent to the E is experienced. However, this is not a seasonal change and cannot be predicted. The rate in both cases is normally 20 to 40 miles per day. Westerly gales produce a surface drift to the E which usually lasts for 1 to 2 days after the blow has passed.

At Butaritari Atoll, observations indicate a general set of 315°, with a drift of 1.8 knots. The current divides at Tabukintetau, the E end of Butaritari Island, setting W along the contours of the reef with a velocity of 2 knots and NNE along the E large island. When the current setting W along the S side of Butaritari again joins the general set, it produces tide rips S of Ukiangang Point, the S point of Butaritari Island.

East of Butaritari Atoll, the set is N, with a drift of 2 knots. West of Butaritari the currents are quite unpredictable. Tide rips are pronounced. The tides setting in and out of the passes through the W reef apparently cause the irregularity of the currents in this vicinity. About 20 miles W of Butaritari the current is back to a normal set of 315°, with a drift of 1.8 knots.

Strong currents are experienced in **South Channel** (3°03'N., 172°45'E.) on springs, and moderate current on neaps. The current sets roughly with the channel, but crosscurrents may be expected, particularly at ebb tide, when the set is across the channel to W and NW.

Depths—Limitations.—The only danger to navigation reported in the vicinity of Butaritari Atoll is the fringing reef. A submerged reef, with depths of 2.8 to over 30m, extends nearly 0.5 mile W from Flink Point, the NW point of Butaritari Island. Reefs also extend about 1.3 miles N from Bikati Island, the NW island of the atoll. There is also some danger along the N barrier reef, as the reef edge breakers do not always show up well.

Aspect.—The SE side of the atoll is almost continuous, with a break 0.3 mile wide near the village **Tabukintetau** (3°03'N., 172°54'E.). There is a depth of 1.2m at HW in the opening. The N side of the atoll is composed almost entirely of a reef which dries for most of its length. There is a boat passage through it, which can be used only between half tide and HW. The W side of the atoll lying on the main reef is broken by three ship passages and several boat passages.

Anchorage.—A sunken reef W of Flink Point, located about 2.8 miles NW of Ukiangang Point, provides good anchorage, in depths of 4 to 21m, coral and sand. Approach this anchorage with the N end of Flink Point bearing 104°. The anchorage is untenable in W winds, which build up a heavy ground swell.

The lagoon of Butaritari Atoll is a large area with general depths, except for scattered shoals, of 18.3 to 36.6m. The SW part of the atoll is the main anchorage.

Directions.—The barrier reef on the W side of Butaritari Atoll is crossed by three ship channels, called North Channel, Central, Channel and South Channel. Vessels should use South Channel only.

South Channel is entered between the N end of the reef extending about 1.3 miles N from Flink Point, and Ramanaba, a detached drying coral reef about 0.4 mile farther North. The channel trends for about 2 miles in a general NE direction to the main anchorage area off Butaritari Island. Before entering the lagoon, vessels are advised to contact the Marine Superintendent at Tarawa and obtain the latest information on navigational aids in the area.

Caution.—Undetected coral heads may exist outside of the wire-dragged areas.

The boat passage S of **Oteariki** (3°10'N., 172°42'E.) and the passage N of **Kotabu Island** (3°05'N., 172°45'E.) have been mined and may still be dangerous.

4.39 Little Makin (3°16'N., 172°58'E.) is the N island of the Gilbert group. This island and the two islands S of it, **Kuup** (Kiebu) (3°14'N., 172°57'E.) and Onne, lie on a reef which is separated from Butaritari Island by a passage about 1.3 miles wide. The W part of Little Makin forms a bight, the head of which is a village, and a government station and flagstaff.

Tides—Currents.—The currents through the passage and in the bight on the W side of the island are strong and irregular.

Anchorage.—Anchorage is not safe at Little Makin at any time.

Banaba (Ocean Island) (0°53'S., 169°32'E.) lies about 302 miles, bearing 219° from Butaritari Atoll (Makin Atoll). The island is surrounded by a fringing reef, which dries and extends out 91m from the shore. Its center, about 81m high and nearly flat, descends in jagged fashion to the coast.

Cliffs from 4 to 9m high surround the island, except for a portion of Home Bay on the SW side of the island. The ETA of a vessel should be sent when within radio range of the island. Pratique may be requested by cable when within 24 hours of arrival.

Winds—Weather.—East winds are predominant throughout the year. Very occasionally, strong W winds blow with squalls of great force and heavy rains at Home Bay. Usually this weather does not last for more than 2 or 3 days, but in exceptional circumstances it may last for a week or 10 days. In the event of such weather, vessels must put to sea.

Tides—Currents.—The current usually sets fairly strongly W, but from December to March it frequently sets E. It is possible that during the W current an eddy may be set up in Home Bay causing the flow close inshore to set E. In Home Bay a NW current with a velocity of about 2 knots was experienced. A vessel endured a current setting W with a velocity of 1 to 2 knots in the vicinity of Banaba (Ocean Island).

4.40 Home Bay (0°54'S., 169°33'E.), on the SW portion of the island, was the site of a phosphate loading facility, but the facility has been out of commission since 1979. There is no harbor and the port facilities are situated on the open coast, which is protected only from winds from the NE quadrant.

Some protection is provided for lighters and launches by a small boat harbor blasted out of the reef near the S end of Home Bay. The boat harbor is protected by breakwaters. There is no anchorage within the bay, but several mooring buoys are situated there. These provide berths for vessels up to 200m in length, and three berths for vessels up to 91m in length.

Pilotage.—Pilotage is compulsory. The pilot will board the ship from 1 to 2 miles SW of Home Bay during daylight hours. The pilot and harbormaster may be contacted on VHF channel 16. The pilot ladder should be rigged on the port side, and the main engines must be on standby at all times.

Directions.—Range beacons, in line bearing 343°, are shown at Home Bay. Vessels approaching the bay from the S or SE are warned to keep to the W of the range line.

Caution.—Strong currents up to 4 knots running either E or W may be encountered off Sydney Point. A depth of 9.1m lies 2.5 miles S from the S extremity of **Sydney Point** (0°54'S., 169°33'E.). Vessels should not approach the island within 2 miles after dark.

4.41 Nauru (0°32'S., 166°55'E.) ([World Port Index No. 56500](#)) is visible for about 18 miles and is of coral formation.

Winds—Weather.—The prevailing wind is between NE and ENE and is rarely stronger than force 4 to 5. In light winds, it is usually stronger near the shore, especially at night. Nauru does not appear to be visited by typhoons, but SW storms occasionally occur. The island has a wet season from November through February. When the wind is from the W, cargo handling is impossible. If the vessel experiences an onshore wind greater than a light breeze, it should be ready to put to sea.

Tides—Currents.—As a rule, the current sets W, but E currents have been encountered. Its rate has been reported to be as much as 3 to 4 knots. A 2 knot current, setting N or S, has been experienced close to the W side of the island. Sailing vessels getting to leeward have great difficulty in making the island.

Depths—Limitations.—There is no harbor except for boats, and the port facilities are situated on an open coast, which is protected only from E winds. Two cantilever phosphate loading berths extend from the W side of the island. Ships secure head and stern-to buoys laid offshore, and are then warped in to buoys moored close to a reef. North of the two piers, a small basin has been blasted out for the use of cargo boats and launches. A depth of 457.2m was found near one of the buoys, about 0.1 mile off the N cantilever.

Vessels up to 40,000 dwt, with a maximum length of 192m and a maximum beam of 28.3m, can be accommodated.

Aspect.—From an approaching vessel, it is seen as two round hummocks some distance apart. The island is surrounded by a fringing reef which extends about 0.1 mile from the shore and is steep-to. The island can be approached to a distance of 0.3 mile, as the reef is easily distinguished.

The SW aspect of the island is radar conspicuous; the airport runway, 1.25 miles long, traverses the SW edge of the island and was reported (1985) as radar conspicuous at 18 miles.

Pilotage.—Pilotage is compulsory and should be ordered well in advance. The boarding ground is about 0.5 mile W of the berth. The pilot boards the vessel with a mooring gang and mooring tackle. No ship's mooring are used. The pilot and

mooring gang remain onboard during loading. The weather is extremely unpredictable and the vessel may be required to sail at very short notice.

Regulations.—Vessels should send their ETA to the local authorities at least 48 hours in advance, confirming 12 hours before arrival and when within 20 miles of the port. Pratique should be requested at least 24 hours prior to arrival. Special instructions and port regulations are published in a letter available on arrival, or from the phosphate company's office in Melbourne, Australia.

Vessels should have their engines in an operational condition while alongside the loaders.

Signals.—The local authorities may be contacted via radiotelegraph, radiotelephone, and VHF.

Quarantine messages should be sent to the Quarantine Officer, Nauru, 24 hours and 12 hours prior to arrival. The message should include the vessel's last port of call and date of departure, the number of crew and passengers aboard, and whether any infectious diseases are present aboard.

The Marshall Islands

4.42 The Marshall Islands are a group of low, coral atolls scattered in two irregular, roughly parallel chains that extend in a NW-SE direction. Besides the 2 main chains there are 6 outlying atolls, so that the whole group consists of about 34 separate groups of low, coral islands lying on circular reefs, most of which surround a lagoon. In general, the E or weather sides rise steeply and those on the lee side slope gradually. Most of the larger islands can be seen from 10 miles. The islets are mostly very low, and although a few of them attain a height of more than 7.6m, the remainder are from 1.5 to 6m high. The dull-green tops of the coconut palms show first above the horizon.

The United States entered into a Compact of Free Association with the Republic of the Marshall Islands on October 21, 1986.

Tides—Currents.—The Marshall Islands are divided by the effects of the North Equatorial Current and the Equatorial Countercurrent into the North Marshall Islands and the South Marshall Islands, with the approximate boundary at 8°30' N.

Currents, varying from 0.5 knot to 1.5 knots, set E in the S part of the groups and W in the N part of the group. When there is a N shift of the N limit of the countercurrent, and especially if a steady W wind is blowing, the currents in the N part of the group may set temporarily to the E.

During strong NE winds, the W current is strongest between Likiep Atoll and Wotje Atoll in the Ratak Chain. On the other hand, the E current is strongest between Mili Atoll and Ebon Atoll. In general, the Equatorial Countercurrent is little felt.

Caution.—Intermittent hazardous missile operations are conducted within an area with a radius of 200 miles, centered at 8°43'N, 167°43'E. Additionally, entry into certain islands of the Kwajalein Atoll is controlled. See the Kwajalein Atoll description in [paragraph 4.61](#) for details.

The Ratak Chain

4.43 The Ratak Chain (Sunrise Chain), the E group, consists of Mili Atoll, Knox Atoll, Arno Atoll, Majuro Atoll, Aur

Atoll, Maloelap Atoll, Erikub Atoll, Wotje Atoll, Likiep Atoll, Ailuk Atoll, Taka Atoll, Utirik Atoll, Bikar Atoll, and Taong Atoll. Mejit Atoll and Jemo Atoll are two detached coral islets in this group. There are no major ports, but some of the lagoons provide anchorage for all classes of ships. Minor ports are situated at Mili, Majuro, Maloelap, and Likiep Atolls.

Winds—Weather.—In Likiep Atoll, NE winds prevail from November to April and often have a force of 3 or 4. Around May or June these winds gradually decrease in strength, and from July to October, when the sea is smoothest, light NE to SE wind with occasional S winds will be experienced. West winds are rare throughout the year; they often indicate approaching storms.

There is little annual change in temperature, though in July and August it is comparatively high, with a maximum average of 31°C. It is difficult to make a definite division between the dry and wet seasons, as some rain falls at all times of the year.

Taongi Atoll lies within the Northeast Trades which blow steadily with moderate to fresh velocities. The dry season (November through June) corresponds to the maximum development of the NE trades, and is characterized by long periods of fair weather. Rainfall totally 50 to 75mm can be expected during each of these months, falling mostly as brief showers.

The wet season (July to November) often has considerable periods of fair weather. Since the mean position of the doldrums is S of Taongi Atoll, the atoll does not experience the change from NE to SE winds that occurs in the more S atolls. However, the fresh NE winds of the dry season may weaken and turn E during this period. There is an estimated 1,030mm of rainfall annually.

Tides—Currents.—It was reported that a vessel, approaching Majuro Atoll from Ailinglapalap Atoll to the W, experienced a strong set to the N and West. According to a native, who has lived on Majuro Atoll for 30 years, the currents off the N and S sides set to the W, and at the E and W end they set to the S. These currents have a velocity of 1 knot.

Between Aur Atoll and Maloelap Atoll, a strong NW current was reported. In July and August this current was reported as setting in an opposite direction. In 1943, heavy rips, setting W, were experienced in this area. Heavy seas are sometimes met with between these atolls.

In 1944, a NW current with a rate of about 0.8 knot was experienced between Ailuk Atoll and Mejit Island. In 1963, strong W currents were experienced between this atoll and Wotje Atoll.

A W current, with a rate of 0.5 knot, was experienced off the W side of Taongi Atoll in November, with an E wind.

4.44 Mili Atoll (5°58'N., 172°07'E.) is the southernmost of the Ratak Chain. Numerous islets lie along the barrier reef, most are from 1.5 to 4m and are covered with coconut palms and other trees.

Mili (6°05'N., 171°44'E.) ([World Port Index No. 56420](#)), the center of activity for Mili Atoll, is situated at the SW end of that atoll. A church, a trading station, and the residence of a native chief are situated on the island.

Tides—Currents.—The tidal currents in the various passages turn at about the time of HW and LW. In Tokowa Channel, the tidal currents set in the direction of the channel

and attain a maximum rate of 3 knots at flood and 2.5 knots at ebb. The tidal currents in Reiher Pass attain a rate of 2.5 knots and set onto the reefs, making navigation difficult. In Acharan Passage the currents set directly through the channel at a rate of about 2 knots.

Depths—Limitations.—The seaward side of the atoll is steep-to. The W of two shoal banks, which has depths of 9.1 to 36.5m, extends 0.75 mile off the barrier reef between Acharan Passage and Reiher Pass, about 3 miles W. The other shoal bank, with depths of 10.9 to 14.6m, extends nearly 2 miles NE from the NE end of the atoll.

The W part of the lagoon is comparatively free from dangers, but its N and E parts are encumbered with sunken dangers. These are hard to identify, except under favorable conditions of light.

Anchorage.—Mili Atoll offers good protection to all classes of vessels in its spacious lagoon. Anchorage may be obtained by vessels with local knowledge about 0.9 mile NE of Mili, with good holding ground. It is the best anchorage on this side of the lagoon, but during NE winds there are heavy seas, and rocks extend about 0.5 mile offshore; it is not recommended at that time of the year, as landing is then very difficult. Large areas in the NW and W parts of the lagoon have been swept to 15.8m.

Port Rhin (Takaiwa Anchorage), which is sheltered from E seas by the reef, extends SE from Tokowa Island, and has depths of about 27.4m, good holding ground.

Anchorage can be taken, in 11 to 25.6m, SE of Burrh Island.

Directions.—Tokowa Channel (Takaiwa Channel), entered between **Tokowa Island** (6°14'N., 171°48'E.) and Burrh Island, is reported to be the best. The channel is about 0.2 mile wide between the reefs, has charted depths of 18.3 to 34.7m, and has been swept to a depth of 15.8m within the limits shown on the chart.

A detached reef, that uncovers, lies about 0.8 mile SSE of the SW end of Burrh Island. The main part of Tokowa Channel leads between this reef and the edge of the reef that extends about 0.8 mile SE from Takowa Island.

Reiher Pass, entered 10.5 miles E of the NW extremity of the atoll, is encumbered with dangers and has a winding fairway. It has been swept to a depth of 13.4m.

Acharan Passage (6°14'N., 171°57'E.) is about 0.5 mile wide between the reefs fringing Narappu and Acharan Islands. A channel about 135m wide has been swept to a depth of 9.1m.

4.45 Bue Passage, about 1.5 miles SE of Acharan Passage, is about 0.5 mile wide between the reef on either side, but only 0.1 mile between the 18.3m curve. Numerous reefs and shoals lie within the lagoon, abreast the pass.

Ennanlik Channel, about 1.3 miles ESE of Bue Passage, is about 0.8 mile wide between the reef on either side, and is deep in the fairway. This channel should only be attempted by small vessels with local knowledge under favorable conditions of light.

Northeast Passage, at the NE extremity of the atoll, is fronted by a line of dangerous reefs, and is difficult to enter except for small vessels with local knowledge.

Knox Atoll (Knox Islands) (5°55'N., 172°09'E.) lies about 2.3 miles SSE of the SE extremity of Mili Atoll, being

separated by Klee Pass, in which there are reported to be depths of 4.9 to 9.1m. Knox Atoll is about 4 miles long and 0.8 mile wide. It is surrounded by a rough coral shelf. The islands are visited by natives of Mili Atoll for the harvesting of copra.

4.46 Keats Bank, located about 79 miles E of Knox Atoll, was reported to have a least depth of 14.6m. When first discovered, it was reported to lie farther to the E and to have a least depth of 8.7m. Vessels should navigate with caution in this area, as other dangers may exist.

Arno Atoll (6°58'N., 171°46'E.), about 43 miles N of Mili Atoll, has the largest land area of any atoll in the Ratak Chain. The islets on the barrier reef are from 1.8 to 2.4m high, and have trees 6 to 21m high. A light is shown from Arno Island, at the W end of the atoll.

Winds—Weather.—Heavy swells set in on the E side of the atoll during strong NE winds.

Tides—Currents.—A strong tidal current sets across the fairway of Dodo Passage at the E side of the lagoon. The maximum rate is about 2 knots. The tidal currents turn about 1 hour after HW and LW.

Depths—Limitations.—Depths of 18.3 to 45.7m are found in the main lagoon. Areas just within the main entrances have been swept to 14.9m within the limits shown on the chart. There are numerous coral heads in the lagoon, especially on the E and S sides.

Anchorage.—Anchorage can be taken in the swept area, W or S of Dodo Island, but is not safe during NE winds.

Directions.—Dodo Passage (7°07'N., 171°42'E.) is considered to be the best channel into the lagoon. It is located on the NE side, about 11 miles S of the N extremity of the atoll.

Tagelib Passage, about 1.3 miles SSE of Dodo Passage, is divided into two channels by Enirik (Enirikku Island). On **Tagelib Island** (7°05'N., 171°43'E.), on the E side of the passage, the trees are 25m high, and are higher than on any of the islands in the vicinity, so that it is easily identified. The N channel is narrow and encumbered by reefs. The E channel is suitable only for small vessels.

Caution.—A depth of 13m was reported (1978) 49 miles E of Arno Atoll. In 1977, breakers were reported 20 miles N of the E extremity of Arno Atoll in 7°29'N, 171°58'E. It was reported (1977) a shoal with a least depth of 7m lies in approximately 7°05'N, 172°44'E.

4.47 Majuro Atoll (7°05'N., 171°23'E.) ([World Port Index No. 56400](#)), a vast natural harbor, lies about 10 miles W of Arno Atoll, being separated by Fordyce Channel. The channel is deep and is reported to be clear of dangers. The atoll consists of more than 50 coral islands, most of which are about 1.5m high. It is a first port of entry. Majuro, the largest island of the group, stretches along the S side of the atoll for a distance of 14 miles. The island is 4.9m high in its W part. At the E end of the atoll are the important islands of Djarrit, Uliga, and Delap. Most of the facilities and the principal settlements on the atoll are centered on the three islands, which are joined by a causeway.

Tides—Currents.—The spring rise of tide is 1.8m, while the neap range is 1.2m.

A current, which does not exceed 0.5 knot, sets consistently W in the lagoon. In Calalin Channel, the main entrance of the

lagoon, the rate for both flood and ebb is about 1 knot. The currents turn at about the time of HW and LW.

The tidal currents and the prevailing E trade winds cause a strong SW set across Calalin Channel at times. Just within the entrance, the maximum flood occurs 4 hours after LW. It sets in a SSW direction at a rate of 0.5 knot. The maximum ebb occurs 3 hours after HW; it sets WNW at a rate of 0.5 knot.

Depths—Limitations.—The W part of the lagoon is studded with coral heads. The E part has a few scattered dangers, but has general depths of 23.8 to 54.9m. Except for these dangers, the W part of the lagoon has been wire-dragged to a depth of 14.9m.

A wharf, about 300m in length has been constructed to the W of the airstrip on Dalap. Vessels are urged to contact the local authorities for the latest information on the facility, as reports differ on the depth of water available here.

New Commercial Dock (7°05.6'N., 171°12.6'E.), on the S side of the lagoon, is 305m long with depths alongside between 16.7m and 18.3m.

Aspect.—A ship approaching the W part of the atoll reported that Majuro Island was identifiable by radar from 18 miles. The atoll, appearing as three small humps, was sighted visually from a distance of 12 miles. Prominent features include a radio tower, a satellite dish antenna, and a tank farm near the wharf.

A tower, marked by a light, stands at Uliga, 1.25 miles N of Dalap.

Pilotage.—Pilotage is compulsory. Vessels should send their ETA 24 hours in advance on 2182 kHz, 2724 kHz, or 5205 kHz. The pilot boards in Calalin Channel. Entry is not recommended at night.

Anchorage.—There are numerous submerged dangers in the W half of the lagoon, and there is no anchorage there except for small vessels with local knowledge. Anchorage may be obtained in the E half, where the bottom is mostly of soft rock. Djarrit Anchorage, considered to be the best, is situated in the NE corner of the lagoon. Depths of 27.4 to 47.5m are found in this anchorage, which is sheltered from winds between N and E.

Directions.—Calalin Channel, about midway on the N side of the atoll, is about 1.5 miles wide between the reefs extending from Eroj Islet on the W and **Calalin Island** (7°09'N., 171°13'E.) on the East. The W channel is marked by lighted beacons which were reported (1992) not in their charted positions, but all continue to mark dangers. No. 4 beacon was reported missing.

There is a ridge in the middle with a least depth of 5.5m over its NW end and 1.2m at its SE end. The channel on the SW side of this ridge is about 0.2 mile wide and deep in the fairway, but there is a drying reef and several shoals, with depths from 1.8 to 5.5m, on its W side. The E channel is only suitable for small vessels. A small islet, located close off the E end of Calalin Island and covered with palm trees, serves as a good landmark.

4.48 Aur Atoll (8°08'N., 171°11'E.) lies about 55 miles N of Majuro Atoll. It is diamond-shaped and has most of the islands, which are wooded, on its E side. Tabal, 2.4m high, is located on the NE extremity of the atoll; Aur, also 2.4m high, is at the S extremity.

Depths range from 18.3 to 82.3m within the lagoon. There are a great number of coral heads, some of which uncover, in the lagoon.

Tides—Currents.—Between Aur Atoll and Maloelap Atoll, a strong NW set is usually experienced, but reports have stated that the current sets in the opposite direction in July and August. Tide rips have been reported here, and heavy seas are sometimes experienced, but no dangers have been discovered.

Depths—Limitations.—There are two main channels leading into the lagoon. **West Opening** (8°19'N., 171°03'E.) is about 0.3 mile wide and has depths of 16.5 to 27.4m. Inside the opening there are reefs and some drying rocks, necessitating sharp alterations of course to avoid them.

Three narrow passages lead through the reef to the S of West Opening. Depths of 11.9 and 14.6m are found in these passages.

South Opening is only 90m wide in the fairway and has depths of 9.1m.

Anchorage.—Anchorage can be taken, in 40.2m, sandy bottom, about 0.5 mile off the lagoon side of Tabal. Vessels can anchor with the extremities of the island bearing 011° and 127°. Shelter from N to SE winds is afforded here.

4.49 Maloelap Atoll (8°30'N., 171°12'E.) consists of numerous islands which are covered with a thick growth of coconut palms and other trees.

Taroa (8°43'N., 171°14'E.) ([World Port Index No. 56390](#)), the principal island, is located on the E extremity of the atoll. A settlement and main wharf exists at Taroa; there are several small piers extending into the lagoon.

Tides—Currents.—The tidal currents in the entrance channels turn at about the time of HW and LW. The maximum rate in **South Opening** (8°32'N., 171°07'E.) is 1.25 knots during the flood and 1.5 knots during the ebb. The maximum rate in **Dollap Channel** (Torappu Channel) (8°52'N., 170°52'E.) is 1.5 knots. During a heavy swell, a steady outward set may occur in **Enijun Channel** (8°36'N., 171°03'E.). There are weak currents in the lagoon.

Depths—Limitations.—Vessels can navigate the lagoon under favorable conditions of light, as the waters are usually clear. Depths vary from about 27.4 to over 73.1m, and several areas have been swept to depths indicated on the chart. Numerous dangers are found in the vicinity of the swept channel leading from Enijun Channel to the anchorage off Taroa. Other scattered dangers are found throughout the lagoon.

Anchorage.—Anchorage can be taken, in 11 to 27.4m, sand and shells, good holding ground, off the W set side of Taroa. This anchorage affords good shelter during the NE trades, but is unsafe during strong W winds. Small vessels with local knowledge can anchor E of Kaven Island. There are shoals, with depths of 2.7 to 9.4m, close E of the island. The holding ground is poor and the anchorage is exposed to NE winds.

Directions.—All channels leading into the lagoon are on the W side of the atoll.

South Opening (8°32'N., 171°07'E.), an opening in the barrier reef, provides a fairway with a minimum width of about 265m between the 18.3m curves, and has general depths in excess of 36.6m. Immediately inside the barrier reef the main channel trends E, S of a reef which uncovers about 1.5m. A

secondary channel trends sharply NW from just inside the barrier reef, S of the aforementioned drying reef, and it has a least depth of 8.2m. South Opening and the main channel have been swept to a depth of 14.9m; the secondary channel has been swept to a depth of 8.5m.

Enijun Channel is divided into two channels by **Enijun Island** (8°36'N., 171°03'E.) and its surrounding reef. A 6.9m shoal lies in the middle of the SE channel, but on either side of this danger are deep passages over 270m wide. Numerous shoal patches lie in the lagoon within the entrance.

The NW channel is nearly 0.3 mile wide and has depths of 20.1 to 27.4m in its middle part. Several deep, but narrow passages lead through the barrier reef between Enijun Channel and Kaven Island, about 21.5 miles NW. They are suitable only for small vessels with local knowledge.

4.50 Erikub Atoll has many small islets all covered with trees, and lies about 45 miles WNW of Maloelap Atoll. **Erikub** (9°01'N., 170°03'E.), on the SW side of the atoll, is the principal islet.

The lagoon should only be entered by small vessels with local knowledge, and then under only the most favorable conditions of weather and light. There are three passages on the W side, the N of which is about 210m wide, is the best. In this passage there are depths of 16.5 to 36.6m, and a channel 118m wide has been swept to a depth of 9.1m.

Anchorage.—Erikub Atoll can be used by small vessels with local knowledge as an emergency anchorage. There is no protection from the winds in the anchorage area. An anchorage area, wire-dragged to 9.1m over an area about 0.5 by 0.8 mile in extent, lies just within NW channel. The bottom is of coral sand, good holding ground. Anchorage in good holding ground has been reported about 0.8 mile E of the S end of **Loj Island** (9°09'N., 169°57'E.).

4.51 Wotje Atoll (9°28'N., 170°14'E.) ([World Port Index No. 56380](#)) lies about 5 miles N of Erikub Atoll. The highest and principal island is Wotje, at the E end of the atoll. It is thickly vegetated. Two boat piers extend out from the W side of the island. The S is suitable only for vessels with drafts of 0.6 to 0.9m. Several shoals extend outward off the head of the pier, and approaches should be made with caution. The second pier is about 0.3 mile N of the other, with a maximum along-side depth of 3m.

The other islands in the atoll are somewhat smaller, relatively low, and sandy. Most population and activities are now centered at Ormed Island, at the NE end of the atoll. **Kojjouw** (Kechautsu) (9°21'N., 169°55'E.), the SW extremity of the atoll, and **Bird Island** (9°31'N., 170°01'E.), in the middle of the N side, can be easily identified. **Goat Island** (9°32'N., 169°53'E.), located on the NW side of the atoll, is reported to be radar prominent from a distance of 18 miles.

Tides—Currents.—The maximum rates of the tidal currents in **Shishmarev** (Schischmarev) **Strait** (9°23'N., 170°06'E.) are 1.75 knots at flood and 1 knot at ebb. The tides turn about 1 hour after HW and LW. Local authorities report that the current always sets W across the channel at a rate of 0.5 knot to 2 knots.

In Meichen Channel, about 1.8 miles W, the flood current attains a rate of 1.25 knots and the ebb a rate of 0.75 knot. The

tides usually turn shortly after the times of HW and LW, but the time of change cannot always be depended upon. A heavy swell causes water to flow over the reef resulting in a constant flow out of the opening and at times across the fairways. A constant W set occurs in the lagoon, but its rate does not exceed 0.5 knot.

Depths—Limitations.—The main entrances are deep and clear of dangers in the fairway. The entire lagoon is navigable between the shoals. Large areas in the E and W parts, including a wide navigable channel connecting them, have been swept to depths of 14 to 16m, while other areas have been swept to lesser depths, all of which can best be seen on the chart. These dangers can readily be seen by a bridge lookout under favorable conditions of light.

Anchorage.—Wotje Atoll affords anchorage for a large number of vessels. Shelter can be found from E winds at least 0.5 mile off the sandy beach fronting the W side of Wotje Island. The bottom consists of sand and broken coral growths. Navigators are cautioned that the reefs off the W side of the island are irregular; drying rocks lie up to 0.3 mile offshore.

Vessels can anchor in convenient depths S of Ormed Island or S of **Nibwung** (Niibunka) (9°32'N., 169°58'E.).

Christmas Harbor, at the NW corner of the lagoon, has depths of more than 11.9m, sheltered from NE and NW winds.

Directions.—Shishmarev Strait (Schischmarev Strait) is considered to be the best entrance, but is difficult to identify from the offing. It is clear of dangers, except for the reefs on either side. It has a least charted depth of 27.4m and has been swept to 16m over a least width of 0.4 mile. Vessels should favor the E side of the channel as the shoal area close off the W edge of Bikeichi Island is clearly visible when the sun is high, whereas the shoals on the Wedge of the channel are more difficult.

Shishmarev Strait is hard to identify from a distance of more than 3 miles. The group of islands, which stands on the reef, located SW of **Toton Island** (9°24'N., 170°06'E.), appear as one large island, particularly at LW. **Eluk** (Erukku) **Island** (9°24'N., 170°08'E.), dome-shaped and about 25m high, and Bwokwlewi Island (Bokureutchi Island), barren of foliage and 9.2m high, are the best landmarks in the approach.

Vessels entering the strait should favor the E side of the channel, as the reefs are more readily identifiable. The reefs fringing the N side of Toton Island are also easy to identify because of discoloration and surf.

Having cleared the passage, vessels can steer a course of 065° for the anchorage W of Wotje Island. The best landmarks for bearings on this course are Eluk Island and Wotje Island.

Meichen Channel, about 2 miles W of Shishmarev Strait, is fairly wide and deep at the entrance and swept to a depth of 18m over a width of about 0.5 mile. Meichen Island, fringed by a drying reef, divides the inner part of the fairway into two channels. The channel E of the island is swept to a depth of 18m over a width of about 0.3 mile. The channel W of the island is swept to a depth of 15.9m over a width of 0.3 mile.

Lagediak Strait (9°24'N., 170°09'E.), entered about 1.8 miles E of Shishmarev Strait, is very narrow and has a depth of 7.3m. It is navigable only by small vessels under the most favorable conditions.

Rurick Strait, at the W end of the atoll, is deep, but narrow. The fairway has been swept to 15m over a least width of 0.2 mile.

Likiep Atoll, lying about 34 miles WNW of Wotje Atoll, is composed of numerous islets, most of which lie on the windward side of the barrier reef. These islets are not more than 1.8m high and are covered with coconut palms. **Likiep Island** (9°49'N., 169°19'E.), the E extremity of the atoll on which is a village and mission station.

South Pass, on the S side of the atoll, is the best entrance into the lagoon. Entered between **Agony Island** (9°50'N., 169°14'E.) and Etoile Island, the pass is about 0.2 mile wide and has charted depths of 27.4 to 54.9m. The entrance is swept to 13.4m over a least width of 270m. South Pass is clearly defined; the fringing reefs and the coral heads are plainly visible under favorable conditions of light.

Entrance Island, surrounded by reefs and a coral bank, with a depth of 1.5m, lies close within the entrance. It divides the inner end of the pass into three channels, each swept to a depth of 13.4m within the limits shown on the chart. The E channel, narrow and deep, leads to the anchorage off Likiep Island. The W channel, between the shoals N of Etoile Island and the 1.5m coral bank, has a swept width of 0.15 mile. The middle channel, which is very narrow, lies between Entrance Island and the 1.5m coral bank. Shoal patches lie N of the swept area of the channel.

Northwest Passage has a least charted depth of 16.5m in mid-channel, and is swept to a depth of 15.9m over a least width of about 160m, with shoal heads swept to lesser depths, as indicated on the chart.

Tides—Currents.—The tidal currents in South Pass attain a rate of 2.5 knots at flood and a rate of 1.5 knots at ebb. They turn at about the time of HW and LW. At neap tides, the tidal currents may set inward continuously at a rate not exceeding 1.75 knots.

The tidal currents in Northwest Passage attain a rate of 2 knots at flood and 2.75 knots at ebb. The tidal currents in the lagoon do not attain a rate of over 0.5 knot.

Depths—Limitations.—The lagoon is cluttered with coral heads and detached shoal patches. Swept areas of 11 to 15.9m, with shoal heads swept to lesser depths, are shown on the chart.

Anchorage.—Large vessels can anchor in the swept area N and NE of Entrance Island. The approach can be made by passing W of Entrance Island. The dangers in this area are plainly visible under favorable conditions of light. Vessels with local knowledge can anchor, in 18.3m, good holding ground, among the reefs N of Likiep Island. A good lookout must be maintained in order to avoid the coral heads in the anchorage area. Many reefs and coral heads lie N and E of the swept area.

Small vessels with local knowledge have found excellent anchorage, in 15.5m, within 0.15 mile SW of the flagstaff on Likiep Island. Such vessels can anchor off the reef fringing the SW side of **Lado Island** (9°50'N., 169°19'E.).

It is reported that good anchorage can be taken over a bottom of coral and sand in the swept area of the NW part of the lagoon. There are numerous coral heads in this area.

4.52 Jemo Island (10°05'N., 169°32'E.), about 20 miles NE of Likiep Atoll, is about 0.8 mile in extent and densely covered by trees. Steep-to reefs, on which the seas break heavily, surround the island and extend about 3 miles ENE from it. A depth of 34.7m lies 13 miles ENE of Jemo Island.

Ailuk Atoll (10°12'N., 169°59'E.), about 42 miles NE of Likiep, consists of numerous islets, some 6.1m high and most of which lie on the E side of the atoll. There is an islet on each of the W and SW extremities. Ailuk Island, the SE extremity of the atoll, is the center of population and activities. There is a stone pier on the NW shore of the island and also a church.

Tides—Currents.—Strong tidal currents are reported in the entrances of the atoll. Both flood and ebb currents attain a rate of 1.75 knots at springs. The tide turns at about the time of HW and LW.

Depths—Limitations.—The lagoon is studded with reefs, coral heads, and pinnacle rocks. It should be navigated by vessels having local knowledge and then under only the most favorable conditions.

Anchorage.—The anchorage areas are poorly sheltered and their approaches are studded with shoals and coral heads. Winds of force 4 are not uncommon.

Small vessels with local knowledge can anchor in 29.3m, about 0.5 mile NW of the lagoon side of Ailuk Island.

Directions.—The three main entrances are located on the W side of the atoll. **Erappu Channel** (10°20'N., 169°55'E.), about 4 miles NNE of the W extremity, is the best passage into the lagoon. It is about 0.1 mile wide and, although the depths are considerable, the fairway is tortuous, being divided into several branches by shoals and sunken rocks.

Marok Channel, about 1.5 miles N, is narrow but straight and deep. Eneneman Channel, about 2 miles farther N, is deep and has some shoal reefs in its inner part.

Mejit Island (10°17'N., 170°53'E.), about 52 miles E of Ailuk Atoll, is nearly 1.75 miles long and fringed by a very steep-to unbroken reef. The N half of the island is flat and the S half is undulating. The entire island is covered with palms and breadfruit trees. A shallow inlet on the W side divides the island into two parts. Landing may be affected abreast the trader's station at the S end on the W side of the island.

4.53 Taka Atoll (11°05'N., 169°38'E.) lies 40 miles NNW of Ailuk Atoll. It has six small islets on its barrier reef. They are uninhabited and are wooded. Taka Passage, on the SW side of the atoll, is about 90m wide and has a least depth of 8.2m. Dangers lie within the entrance and throughout the lagoon. The pass should only be used by small vessels with local knowledge under the most favorable of conditions. Anchorage is not recommended.

Utirik Atoll lies about 4 miles E of the NE extremity of Taka Atoll. **Aon Island** (11°13'N., 169°46'E.) is the SW extremity of the atoll and is covered with coconut palms. Utirik Island, the E extremity of the atoll, is the site of a village and center of all activities. Shoal reefs extend a considerable distance off and many reefs front the lagoon side of Utirik Island. A long sandspit extends W from the island. The lagoon is studded with dangers. Uncharted reefs may exist, and the charted position of some of the dangers may be inaccurate. The atoll was reported to be a good radar target up to 14 miles distance from the E and South.

Depths—Limitations.—A least depth of 5.2m is reported in Utirik Passage, near the W extremity of the atoll. Many coral heads, with depths of 4.1 to 5.5m, lie in or near the fairway.

Directions.—Utirik Passage is difficult to navigate as the reefs near it are hard to identify and there are no good land-

marks in the area. Small vessels with local knowledge should only attempt to enter the passage under the most favorable of conditions. The transit should be made at half tide. Such vessels should proceed at slow speed as the reefs are not identifiable until close aboard; due allowance must be made for the effects of winds and currents. Navigation in the lagoon is difficult.

4.54 Bikar Atoll (12°11'N., 170°06'E.) lies about 55 miles NNE of Utirik Atoll. There are numerous islets, covered with trees, nearly all of which lie on the reef on the E side of the atoll. Light scrub bushes are found on the outer fringe of the islets, thickening to heavy undergrowth towards the middle. Numerous birds and turtles are found on the islets. **Jabwelo Island** (Jaboerukku Island) (12°15'N., 170°08'E.) was visible 12 miles from NW. The island was picked up by radar at about the same time.

Bikar Passage is suitable only for small craft, as its inner end is shallow and strong currents run through it. The lagoon is, for the most part, shallow and studded with reefs.

Caution.—The barrier reef extends up to 0.5 mile further seaward on its NE side than charted.

A group of reefs or shoals, with depths of 12.8 to 40.2m, are reported to lie in 13°12'N, 168°55'E.

Taongi Atoll (14°32'N., 168°55'E.), the N islet of the Marshall Islands, is located about 150 miles NNW of Bikar Atoll. All of the islets, which are low, sandy, and densely covered with bushy scrub trees up to 7.6m high, stand on the SE side of the atoll. The outer reef is continuous except for a boat passage on the W side of the atoll. There are no inhabitants, and the islets are rarely visited. It serves as a haven for sea birds.

With E winds the sea breaks over the reef on the E side of the atoll and into the lagoon. From about 4 hours before to 4 hours after LW, the outgoing tidal current is reported to attain a rate of 10 knots through the boat passage on the leeward side of the reef. There is a SW set along the leeward side of the reef.

The boat passage can only be used at slack water, and then under only the most favorable conditions. The lagoon is shallow and presents a mucky appearance.

The Ralik Chain

4.55 The Ralik Chain (Sunset Chain) consists of 15 atolls and the three small coral islets of Kili Island, Jabwot Island, and Lib Island. The chain consists of Ebon Atoll, Namorik Atoll, Jaluit Atoll, Ailinglapalap Atoll, Namu Atoll, Kwajalein Atoll, Lae Atoll, Ujae Atoll, Wotho Atoll, Rongerik Atoll, Rongelap Atoll, Ailinginae Atoll, Bikini Atoll, Enewetak Atoll, and Ujelang Atoll. There are no major ports, but some of the lagoons provide anchorage for all classes of ships. Kwajalein Island is the site of the most important port in this group. Minor ports are situated at Jaluit Atoll and Enewetak Atoll.

Winds—Weather.—East winds prevail in the vicinity of Jaluit Atoll. Winds 65 to 85 per cent of the time in the vicinity of the atoll blow between NE and E during the months of November through August. In November the wind gradually backs to N and becomes NE in January. It reaches its maximum strength in December. Beginning in March the wind gra-

dually diminishes in strength and changes to an E direction. Mild SE winds prevail from June to October. This is the period of calms and least precipitation. At this time, the wind may sometimes shift to the S and W. Storms often follow winds from the latter direction. Typhoons are rare.

Temperatures range from 25° to 31°C. Precipitation is comparatively heavy from November to January.

In the vicinity of Ailinglapalap Atoll, NE winds blow continuously from November to April with Force 3 or 4. They gradually decrease in strength in May and June, and change to E. South winds often occur during this period. From July to October, the winds are weak and the sea is usually calm. West winds are rare. A N wind is considered to be a forerunner of stormy weather. Precipitation is heavy in June and July.

The winds in the Kwajalein area blow mainly from the E to NE. Winds from the SE sometimes blow during the rainy season. Observations have shown the prevailing winds to be ENE, averaging 8 to 20 knots about 70 per cent of the time, with a maximum velocity of 30 knots.

During the dry season (December through March), the Northeast Trades blow steadily with moderate to fresh velocities. There are extensive periods of good weather.

In the time of the rainy season (April through November), the winds are weaker and more variable. Gales are infrequent, but occur for brief periods during the rainy season. Heavy squalls and cloudiness occur. Temperatures are as follows: maximum high 33°C or 34°C; average mean 27°C or 28°C; and low 22°C or 23°C.

The mean annual rainfall is about 2,030mm. Rainfall gradually increases through the spring and summer to over 250mm per month during September through November.

There is a conspicuous diurnal variation in rainfall. The rain falls mostly at night, with a maximum in the early morning, usually decreasing rapidly after sunrise. There is a small secondary increase in the late afternoon, with a secondary minimum near midnight.

Thunderstorms are most frequent during the autumn rains, when they occur 4 to 5 per cent of the time. Typhoons, although uncommon, are not unknown.

In the vicinity of Enewetak Atoll, NE winds are strong from October to March. They shift to the E gradually and from the latter part of March to June blow from that direction. In June or July the winds blow from a S direction. Squalls increase in June, and occur most often in June or July. During this period, the sea is often smooth and the temperature reaches a maximum. West winds are rare throughout the year.

Rainfall averages 1,420mm annually. July to November are usually the rainy months. The dry season occurs from December through May. At Ujelang Atoll, the months of January, February, and March are comparatively dry, and a marked increase in rain attends the months between June and November, when the trades are least active. This definite division into a dry and wet season is less pronounced over the S islands.

The mean temperature is about 28°C, with the maximum seldom going above 30°C. The minimum is about 25°C or 26°C. The humidity is high.

Tides—Currents.—See also the "Tides—Currents" topic under the Marshall Islands heading in [paragraph 4.42](#). The current is reported to set E in the vicinity of Namu Atoll. A strong

W current was reported off the W side of Lib Island. In 1958, the current in the vicinity of Bikini Atoll was reported to set W to WNW at a rate of 0.5 to 2 knots. A W current with a rate of 0.75 knot was experienced 5 miles SW of Ujelang Island. A NE current, with a rate of 0.75 knot, was reported (1963) off the S side of Ailinglapalap Atoll.

4.56 Ebon Atoll (4°34'N., 168°42'E.) is the southernmost of the Ralik Chain of the Marshall Islands. Islets stand on all but the N side of the reef. **Ebon Island** (4°34'N., 168°42'E.) is the principal island of the atoll. Ebon Channel, on the SW side of the atoll, is the only passage into the lagoon. It is narrow, tortuous and crooked, and only suitable for small vessels with local knowledge at slack water. A jetty extends about 30m from the S side of Meidj Island on the W side of **Ebon Channel** (4°36'N., 168°41'E.), and there is a long pier near the village on Ebon Island. The coral reef off Meidj Island extends parallel with the channel and is hard to identify. The lagoon is mostly deep and clear. The coral formations on the lagoon side of the channel can usually be identified.

Tides—Currents.—The flood attains a maximum rate of 3 knots and the ebb a maximum rate of 5 knots. The outgoing tidal current from the W channel tends to turn the head of a vessel entering E. The tidal current from the next channel sets across the fairway, and striking the reef N of Juridi Island is deflected NW. Thus, it strikes an incoming vessel on the starboard bow, making it difficult to keep clear of the reefs on the W side. The incoming tidal current affects a vessel in the opposite direction, except that there is no countercurrent NW off Juridi Island.

Anchorage.—Anchorage can be taken, in 25.6m, off the trader's store, near the W end of Ebon Island. This anchorage is exposed to NE winds.

Directions.—Ebon Channel is suitable for small vessels with local knowledge under the most favorable conditions of light and weather. Vessels entering the lagoon should steer in, with the middle of the entrance bearing about 020°, keeping in mid-channel until abeam the S end of Juridi Island. Then, if the outgoing tidal current is running, the Meidj Island side of the channel should be favored until abeam the point of reef opposite the N end of Juridi Island. The course then should be altered sharply round the reef into the channel, steering about 076°, which is the general direction into the lagoon.

After clearing the reef, vessels should keep N when passing the branches, as the tidal current setting out strikes the vessel with considerable force. Vessels should then pass N of the small detached point of the inner extremity of the reef.

4.57 Namorik Atoll (5°35'N., 168°07'E.), about 63 miles NW of Ebon Atoll, consists of two wooded islands on the reef enclosing the lagoon. A coral islet stands between them on the reef, with numerous black boulders. The very shallow lagoon is cut off from the sea by the drying coral reef. Boats can cross the reef with difficulty, at HW on the W side of the atoll. There is a trade's store on the W side of Namorik Islet, on the S side of the atoll.

Landing near the W side of Namorik Islet can be effected about 90m S of it. There is no shelter during NE winds, and it is dangerous with strong SW winds when there is a heavy sea. There is a fringing reef which extends about 135m in the

vicinity of the landing place. There is depth of about 1.2m and there are rocks in places. Two stranded wrecks lie about 90m off the S shore along the reef line.

Kili Island (5°38'N., 169°07'E.), 58 miles E of Namorik Atoll, is about 1 mile in length and surrounded by coral reefs. It is also densely covered with trees. A reef, having a depth of 18.3m, extends 0.5 mile SW from the SW end of the island. There is usually too heavy a sea to anchor on it.

4.58 Jaluit Atoll (5°47'N., 169°37'E.), about 83 miles NNE of Ebon Atoll, forms a large natural harbor. The atoll appears as one long, low island covered with coconut palms when approaching from the S. One of the important islands is Jaluit, a long narrow island on the SE side of the atoll.

Jabor (5°55'N., 169°39'E.) ([World Port Index No. 56410](#)) is a minor port on Jaluit Atoll, but serves as a trading center for the Marshall Islands. Cargo is handled at the anchorage. Lighters are available. A light is shown from a water tower on the N end of Jaluit Island.

Tides—Currents.—The tidal currents are strong near the entrances, and change at about HW and LW. In the lagoon, they have no definite direction and are influenced by wind. They rarely attain a rate of more than 1 knot.

The tidal currents are strong in Southeast Pass and set in a N direction across the entrance of the channel. When the flood current is strongest, a countercurrent sets along the inner edges of the reefs and islands. In the S inner channel of the Southeast Pass, the flood attains a rate of 3 knots and the ebb a rate of 2.5 knots.

The tidal currents are strong in Northeast Pass. They attain a rate of 2.25 knots on the flood and a rate of 2.5 knots on the ebb.

The tidal currents attain a rate of 2.75 knots on the flood and 2.25 knots on the ebb in the channel NW of Northeast Pass. The tidal currents attain a rate of 2.75 knots on the flood and 2.75 knots on the ebb in the entrance of the channel E of Northeast Pass.

The tidal currents in Southwest Pass attain a rate of 2.25 knots on the flood and 3 knots on the ebb.

Depths—Limitations.—Caution is advised when navigating the passes or the lagoon, due to the age of the survey. The passes into the lagoon and the lagoon itself have adequate depths for all classes of vessels. The N and W parts of the lagoon contain numerous coral heads. Wide channels swept as indicated on the chart leads from Northeast Pass, and the passes close E and W to Imieji Anchorage and **Jaluit Anchorage** (5°55'N., 169°38'E.). Swept channels also lead from Southeast Pass and Southwest Pass to these anchorages.

Many dangers are found in the swept areas of the anchorages and in their approaches. Numerous dangers lie in the N approach to **Ship Channel** (5°56'N., 169°39'E.).

The SE side of the atoll is rather steep-to and there is usually a heavy surf. The SW side of the atoll, between **South Point** (5°47'N., 169°37'E.) and Pinglap Island, a little over 13.5 miles NW, has wide beaches and very little surf. North of Pinglap Island, the reef is covered with about 1.5m of water at HW.

Breakers, about 1.2m high, are reported in 6°19'N, 169°06'E, a little over 19 miles W of **Bogenaga Island** (6°17'N., 169°25'E.), near the N extremity of the atoll.

Directions.—Several passes lead into the lagoon, Southeast Pass, Northeast Pass and two adjacent passes. Southeast and Northeast Passes are the most used by large vessels.

Southeast Pass, the main entrance of Jaluit Anchorage, is about 0.4 mile wide between the reefs on either side. The pass has been swept to a depth of 14.9m in the fairway. Within the lagoon, the pass divides around the reef enclosing Kabbenbock Island into three channels.

The S channel of the inner channels leads between the reefs fringing Jaluit Point and those fringing Kabbenbock Island. Abreast Jaluit Point, the channel is narrowed to a width of less than 0.1 mile, with depths of 14.6 to 29.3m in the fairway. Then the channel, which has been swept to a depth of 13.4m, leads to Jaluit Anchorage.

Ship Channel extends in a N direction between the reefs fringing Kabbenbock Island and those fringing Enybor Island. The fairway has been swept to a depth of 12.8m over a width of 135m. A large sandbank divides the inner part into two passages, both of which are navigable. The E passage is best as it has been swept.

Northeast Pass, about 7 miles NW of the E extremity of the atoll, has been swept to a depth of 14.9m over a least width of about 135m.

A pass, situated a little less than 1 mile NW, has a swept depth of 14.9m over a least width of about 0.2 mile. It leads between the reef fringing Imrodj Island and that fringing Medyado Island. Within the entrance, a narrow channel leads SW between numerous detached coral reefs into the lagoon, and a wider channel leads in a NW direction along the lagoon side of the atoll reef.

A pass, swept to a depth of 14.9m over a width of nearly 0.3 mile, leads between the reef fringing **Kinadyeng Island** (6°06'N., 169°38'E.) and the reef to the E. Within the pass it divides into three narrow channels, which then leads between numerous reefs into the lagoon.

Southwest Pass, swept to a depth of 14.9m over a least width of 135m. is suitable only for small vessels with local knowledge. The pass is tortuous, and to be used under only the most favorable conditions. Such small vessels use this pass during periods of NE winds.

Most of the buoys cannot be relied upon as they are either missing or off station.

Northeast Pass is unmarked, except for the cement foundation of a destroyed beacon on the W side of the channel and a black beacon with a rectangular topmark on the SE side of the channel. The former is visible at LW.

Anchorage.—Winds from the N and W quadrants cause choppy seas in the lagoon, but good anchorages over sand and coral is available for all classes of vessels. Good anchorages are reported throughout the E part of the lagoon and within all of the main passes. The areas close within these entrances are not suitable for anchorage, as they are exposed to wind and sea and have strong tidal currents.

Jaluit Anchorage affords shelter from winds between NE and SE, and is suitable for all classes of vessels.

Imieji Anchorage (6°00'N., 169°40'E.) has been swept to 14.9m, with shoal spots swept to lesser depths, as indicated on the chart. Some of the numerous dangers in the approaches to this anchorage are buoyed, but they cannot be relied upon.

Small vessels with local knowledge should only attempt to reach this anchorage, and then under the most favorable of conditions.

Directions.—Vessels bound for Jaluit Anchorage or for Jabor should enter the lagoon by Southeast Pass unless permission has been obtained to enter by one of the other passes. The reef on the N side of the channel is readily identifiable, but the reef on the S side of the pass is somewhat more difficult to distinguish.

Vessels entering, in order to avoid making too sharp a turn in the channel, should favor the N side of the entrance by steering for the S extremity of Kabbenbock Island on a course of about 270°. This course leads about 0.1 mile S of the reef fringing Enybor Island. Then the course should be gradually altered, so as to pass in mid-channel through the S channel and to the anchorage.

Ailinglapalap Atoll

4.59 Ailinglapalap Atoll (7°16'N., 168°50'E.) lies about 67 miles NNW of Jaluit Atoll and is a series of low islands strung out along the atoll reef. The numerous islands are not more than 1.5 to 8m high, but most of them are covered with tall coconut palms appearing black in color. They can be made out from a distance of 10 miles. Ailinglapalap Atoll was reported (1963) to lie from 1 to 2 miles S of its charted position.

Tides—Currents.—In South Pass, the flood current attains a maximum rate of 2 knots and the ebb a maximum rate of 2.5 knots. The currents turn about 1 hour after HW and LW.

In **East Pass** (7°18'N., 168°51'E.), the flood attains a rate of 1.5 knots and the ebb a rate of 1.75 knots. In **Mezetchoku Passage** (7°29'N., 168°44'E.), the flood attains a rate of 2 knots and the ebb a rate of 2.25 knots. In **Begangu Passage** (7°30'N., 168°40'E.), about 2.5 miles W of Mezetchoku Passage, the flood attains a rate of 0.75 knot and the ebb a rate of 1.5 to 1.75 knots.

Depths—Limitations.—The main passes and the lagoon are fairly deep, except for scattered shoals and coral heads. An irregular-shaped area connecting South Pass and East Pass with Berangu Passage and Mezetchoku Passage has been swept to 14.9m, with shoal spots swept to lesser depths. Shoals are readily seen under favorable conditions of light.

There are eight passes leading into the lagoon, one on the S side, three on the E side, and four on the N side. South Pass, East Pass, Berangu Passage, and Mezetchoku Passage have been swept. The remainder are only suitable for small vessels with local knowledge.

South Pass is about 0.1 mile wide and curving. It has been swept to a depth of 14.9m within the limits shown on the chart. It is reported that the pass is not suitable for large vessels due to its narrowness and strong currents.

East Pass has depths of 5.5m, and is about 0.5 mile wide. It has been swept to 5.2m over a least width of about 0.3 mile. A swell sets into the pass during NE winds.

Berangu Passage is about 0.3 mile wide and has been swept to a depth of 14.9m. On entering the lagoon, vessels using this pass must steer SE to avoid the reefs.

Mezetchoku Passage is very deep and has been swept to a depth of 14.9m over a least width of about 0.1 mile. Shoals lie close to the channel limits.

Anchorage.—Large vessels can anchor, as convenient, within the lagoon, in 29.2 to 54.9m, clear of the scattered shoals. The best anchorage is on the W side of the island next E of **Bigatyelang Island** (7°17'N., 168°43'E.), but even here the holding ground is coral the tidal currents are strong. The bottom slopes steeply about 0.1 mile outside this anchorage. The anchorage is sheltered from N and E winds.

Jabwot Island (7°45'N., 168°59'E.), lying about 9 miles N of the N extremity of Ailinglapalap Atoll, is about 0.8 mile in length, and is fringed with reefs. A 1968 report states that the fringing reef appears to drop off sharply within several hundred meters from 150 to 200m of the beach. A reef extends approximately 1 mile off the NW point of the island.

4.60 Namu Atoll (7°45'N., 168°15'E.) lies about 25 miles NW of Ailinglapalap Atoll and consists of over 50 small islets, most of which lie on the E side. Kagenen Island, located on the NE side of Namu Atoll, appears as three distinct islets when approaching from the N. Coconut palms and breadfruit trees grow on most of the islets. There is a trading station on **Namu Island** (8°12'N., 167°58'E.), at the N extremity of the island.

Anil Channel (7°48'N., 168°12'E.) is narrow and divided into two channels, the S of which is only 90m wide. The channel should be used only by small vessels with local knowledge, under favorable conditions of light.

Bock Channel (8°03'N., 168°07'E.), about 135m wide and deep in the fairway, leads into the lagoon from the northernmost entrance of the W side of the lagoon. The entrance channel is divided into two channels by a ridge of reefs. Bock Islet, 2.4m high, stands on the N side of the entrance. The approach to the channel should be made on a course of about 086°. The channel should only be entered under the most favorable conditions of light. When within the entrance, vessels should alter the course to port and navigate (by sight) through the NW channel.

Anchorage.—Anchorage can be taken by vessels with local knowledge inside the lagoon off **Leuen Island** (7°45'N., 168°14'E.), in 27.4m, coral. There is little swell at this anchorage, but it is exposed to NE winds. The best anchorage is off the house near the NW end of the island.

Caution.—Great caution should be observed when passing to leeward of the atoll because of a SE current. Breakers are rarely seen on the reefs on the lee side of the atoll, between the months of May and September.

There are scattered shoals in the lagoon. These can only be identified under favorable conditions of light.

Lib Island (8°19'N., 167°24'E.), 34 miles WNW of Namu Atoll, is about 0.8 mile in length and fringed by a steep-to reef which extends from 0.1 to 0.2 mile offshore. The edge of the reef is steep-to, and landing may be effected on its W side on a calm day at HW.

Kwajalein Atoll

4.61 Kwajalein Atoll (8°43'N., 167°44'E.), about 33 miles NNW of Namu Atoll, consists of more than 90 islets and islands mostly covered with coconut palms from 17 to 29m high. They lie along the atoll reef which surround a lagoon that has an area of approximately 655 square miles. The reef is

submerged for long stretches, especially on the SW side of the atoll. The S islands are covered with a dense growth of coconut palms and small vegetation. The islands to the N are mostly wooded.

Certain islands of Kwajalein Atoll are under military jurisdiction and require special authorization for entry.

Kwajalein Missile Range—Warning Area.—The waters within a circular area with a radius of 200 miles, centered at 8°43'N., 167°43'E., are so designated. Intermittent hazardous missile operations will be conducted within the area 24 hours daily, on a permanent basis.

Normally, operations in the Kwajalein Missile Range are covered by HYDROPAC messages.

Regulations.—Full particulars dealing with entry applications to the Kwajalein Missile Range are contained within Title 32, Code of Federal Regulations, Part 525. These regulations apply to all persons, ships, and aircraft wishing entry to the Kwajalein Missile Range. The entry authorizations issued under the authority of these regulations do not apply to entry to any other areas of the Marshall Islands. In addition to the controls covered by this regulation, movement within the Missile Range, the territorial sea of, and airspace over it, is subject to the local control of the Commander, Kwajalein Missile Range.

Kwajalein Missile Range is defined as all those defense sites in the Kwajalein Atoll, Marshall Islands, including airspace and adjacent territorial waters, to which the United States Government has exclusive rights and entry control by agreement with the Trust Territory of the Pacific Islands and the Republic of the Marshall Islands.

In accordance with Title 19, Chapter 3, Section 101 of the Code of Trust Territory of the Pacific Islands, territorial waters mean "that part of the sea comprehended within the envelope of all arcs of circles having a radius of 3 miles drawn from all points of the barrier reef, fringing reef, or other reef system of the Trust Territory, measured from the low-water line, or, in the absence of such a reef system, the distance to be measured from the low-water line of any island, islet, reef, or rocks within the jurisdiction of the Trust Territory."

Entry requirements are, as follows:

1. Ships or other marine vessels in the following categories, except those which have been denied entry or have had a prior entry authorization revoked, may enter the Kwajalein Missile Range territorial waters upon request to and approval of the Commander, Kwajalein Missile Range:

- a. U.S. private ships which are:
 - (i) Under charter to the Military Sealift Command, or
 - (ii) Employed exclusively in support of and in connection with a Department of Defense construction, maintenance, or repair contract on Kwajalein.
- b. Trust Territory of the Pacific Islands/RMI ships which have been approved by the resident representative on Kwajalein.
- c. Any ship in distress.
- d. U.S. public ships which are providing a service to the Kwajalein Atoll in accordance with their agency responsibilities

2. All other ships or marine vessels must obtain an entry authorization from the National Range Commander before

entering the Kwajalein Atoll territorial sea. The entry authorization application should reach the National Range Commander at least 14 days prior to the desired entry date and should include the following information:

- a. Name of ship.
- b. Place of registry and registry number.
- c. Name, nationality, and address of operator.
- d. Name, nationality, and address of owner.
- e. Gross tonnage of ship.
- f. Nationality and numbers of officers and crew (include crew list when practicable).
- g. Number of passengers (include list when practicable).
- h. Last port of call prior to entry into area for which clearance is requested.
- i. Purpose of visit.
- j. Proposed date of entry and estimated duration of stay.
- k. Whether ship is equipped with firearms or photographic equipment.
 1. Whether crew or passengers have in their possession firearms or cameras.
3. Entry authorizations may be granted for either single or multiple entries.
4. Captains of ships and/or marine vessels planning to enter Kwajalein Missile Range shall not knowingly permit excluded persons to board their vessels.
5. U.S. public ships which are authorized to enter defense areas by the controlling Defense Department agency may enter the Kwajalein Atoll territorial sea without the specific approval of either the National Range Commander or the Commander, KMR, provided that the Commander, KMR, is notified as far in advance of the impending entry as is consistent with the security requirements pertaining to such movement.

The Commander, Ballistic Missile Defense Systems Command, is the National Range Commander.

1. Address: National Range Commander, Kwajalein Missile Range, Ballistic Missile Defense Systems Command, ATTN: BDMSC-R, P.O. Box 1500, Huntsville, Alabama 35807.

2. Electrical address: CDRBMDSCOM HUNTSVILLE AL//BMDSC-R//.

The Commander of the Kwajalein Missile Range is situated at Kwajalein Island, Republic of the Marshall Islands.

1. Address: Commander, Kwajalein Missile Range, P.O. Box 26, APO San Francisco 96555.
2. Electrical address: CDRKMR MI//BMDSC-RK//.

Signals.—Twenty-four hours prior to operations, "Range Command Center" will broadcast a voice warning on 2716 kHz. Range operations also are usually covered by HYDR-PAC messages.

Kwajalein (8°43'N., 167°44'E.)

World Port Index No. 56370

4.62 Kwajalein, the principal island of the atoll, lies at the SE end of the atoll and is 26m high to the tree tops. Numerous

oil and water tanks, an airfield, and other installations are situated on the island.

Kwajalein Island observes M time zone and E hemisphere date. This puts the island 22 hours ahead of Hawaii.

Tides—Currents.—The mean range of tide is 1m, while the maximum range is 2m.

A W current with a rate of 1.5 knots sets along the S side of Ebadon Island, the W extremity of the atoll. The currents throughout the lagoon set SW at a rate of 2 to 3 knots. They do not reverse on changing tide. The currents are strongest at half ebb. The currents off the W side of the atoll are reported to be variable.

During periods of strong NE winds (October through June) and at half ebb, a 3 knot current has been observed setting through South Pass, about 5 miles NW of Kwajalein Island. At the same time, a current setting NW at a rate of 2 to 3 knots sets along the lagoon side of Ennyabegan Island, about 1.3 miles NW of South Pass, toward Gea Pass.

The ebb current in **Gea Pass** (8°49'N., 167°35'E.), a little less than 1 mile NW of Ennyabegan Island, attains a maximum rate of 2.25 knots at spring tides and sets in a WSW direction.

There is usually a SW-NW set in Milu Pass (Mellu Pass), about 4.5 miles SW of the N extremity of the atoll, at a maximum rate of 2 knots. The flood attains a rate of 1.5 knots and the ebb a rate of 2 knots.

The directions of the tidal currents in North Pass, about 2.3 miles NE of Milu Pass, are variable. The estimated rate of the current is about 3 knots.

Depths—Limitations.—General depths of 29.3 to 54.9m are found throughout the lagoon, except near the atoll reef. As a rule, greater depths are found in the S part of the lagoon. There are a number of small reefs and coral heads scattered throughout the lagoon; some of these are marked by buoys. These dangers are visible under favorable conditions of light. Many passages within the lagoon have been wire-dragged, as indicated on the charts.

The main cargo complex is an L-shaped structure. The long side runs E and West. The N face is designated Foxtrot Pier. This pier is 274m long with the furthest 150m from shore used for berthing. The depths in this area range from 7.6 to 11.5m.

The side facing the lagoon runs at a bearing of 020° and is designated Echo Pier. This pier is 97.5m long and has dolphins to accommodate vessels up to 192m. Depths along Echo Pier range from 10.4 to 11.5m.

Alpha Pier, Bravo Pier, Charlie Pier, and Delta Pier have depths of 4.5 to 6.1m, and are generally not used for visiting vessels.

A T-headed petroleum berth is situated S of Echo Pier and has an alongside depth of 9.1m.

A fuel pier is situated on the SE side of the island of Roi-Namur, but no details are presently available on the facility. Several small craft piers are situated on several of the islands around the atoll, some of which are in a state of disrepair.

Large vessels enter the lagoon by way of Gea Pass. It is buoyed and nearly 0.2 mile wide between the 18.3m curves. It has depths of over 36.6m in the fairway. The channel has been swept to a depth of 14m over a least width of about 270m.

South Pass has been wire-dragged to a depth of 5m. Its entrance is marked by buoys. Heavy seas are found in the channel during S winds.



Photo courtesy of D. Sweeney

Kwajalein—Echo Pier

Milu Pass (Mellu Pass) (9°21'N., 167°25'E.), the N entrance for larger vessels, is about 0.4 mile wide between the 9.2m curves. It is easy to identify because of the break in the heavy surf on the reef. The pass has been wire dragged to 14m over a least width of about 0.4 mile. Sand Islet, located about 1 mile SSW of Milu Island (Mellu Island), is a shifting sandbar surrounded by a shoal with depths of less than 18.3m.

North Pass, about 2 miles NE of Milu Pass, is used only by small vessels.

Enewetak Passage, located 16 miles N of Kwajalein Island, is entered between Kwadack Island and Meck Island. Enewetak Island lies on the W end of the passage. There is a channel, swept to 7m, between Enewetak Island and Kwadack Island, but the area is encumbered with shoals with depths of 4 to 4.9m, and there are no navigational aids.

Bigej Channel, about 8 miles North Kwajalein Island, is a wide and generally shallow channel dragged to a depth of 6m, and marked by buoys. Depths of 9.2m in the center of the channel were reported in 1983, and shoals are readily observed under favorable light conditions.

Aspect.—Numerous uncharted structures exist on Kwajalein Atoll, making identification of the charted features difficult.

The Kwajalein Harbor Control Tower is situated near the main pier on Kwajalein. A red and white calibration tower, 48m high, stands near the W end of the island, with another tower 19.5m high, about 0.5 mile E of it. Two wooden poles, which support radio antennas, stand near the N end of the island. An aviation light is situated a little less than 1 mile ESE of the W extremity of the island. The DCCB warehouse is the most obvious structure on the W side of the island. This is a 36m high concrete structure. It has a triangular face to the N and rectangular face on the S and West.

Ebeye Island has a microwave tower (8°46.5'N., 167°44.4'E.) on the S end. While this tower is difficult to see in daylight, it has a white stobe light that can be seen for up to 30 miles at night.

Landmarks in the **Roi-Namur** (9°24'N., 167°28'E.) area are unreliable. On the E side of the atoll, obstruction lights are shown from the various islands.

An aero light is shown from the middle of Roi-Namur at the N extremity of the atoll, 43 miles NNW of Kwajalein Island; this light is of exceptional visibility and has been mistaken for the aeronautical light on Kwajalein Island.

Pilotage.—Pilots are available. Pilotage is not compulsory for vessels proceeding to an anchorage in the lagoon. It is,



Photo courtesy of NOAA Ship KA'IMIMOANA

Kwajalein Fuel Pier

Berthing is arranged through the harbormaster. All ship movements within the lagoon are controlled by Kwajalein Harbor Control on Kwajalein Island.

Signals.—Notice of ETA must be given 24 hours in advance and any change of more than 1 hour must be made at least 6 hours prior to arrival. Kwajalein Harbor Control may be contacted on VHF channel 12.

Anchorage.—Kwajalein Atoll affords good anchorage to a large number of vessels of all classes, in 27.4 to 54.9m, coral and sand.

Anchorage Alpha, centered in position 8°45.09'N, 167°43.08'E, is designated for vessels less than 122m in length. Anchorage Bravo, centered in position 8°46.05'N, 167°42.60'E, is designated for vessels greater than 122m in length.

Kwajalein Anchorage extends from about 1.5 to 9 miles off the lagoon side of Kwajalein Island. The entire area, with the exception of a few scattered shoal spots, has been wire-dragged to 14m. It provides one of the best anchorage areas in the Marshall Islands.

Roi-Namur Anchorage, in the N part of the lagoon, has many anchorage berths. Most of the area has been wire-dragged to 14m, although small sections near the N and NE reefs have been dragged to lesser depths. These anchorages are exposed to S winds. Anchorage at Roi-Namur should be done only under the guidance of Kwajalein Harbor Control.

Directions.—When wind velocities exceed a rate of 35 knots, incoming vessels should be alert for instructions, as they may be directed to an anchorage rather than to an alongside berth. During the typhoon season (July to December), vessels should contact the weather station prior to departure.

Vessels approaching Gea Pass from the S should make certain that the pass is open and that Lighted Buoy No. 6 is clearly identifiable. A course of 074°, with that buoy ahead, leads mid-way between Lighted Buoy No. 2 and Buoy No. 3. The currents in this area are usually S, but N currents have been ex-



Kwajalein—Roi-Namur

however, recommended. Pilotage is compulsory for vessels berthing alongside.

Vessels approaching Gea Pass from the SE should board the pilot in the vicinity of South Pass. The pilot will board vessels approaching from other directions from a position off Gea Pass. Docking pilots board inside the lagoon, about 2 miles NW of the piers on Kwajalein Island. Full power is required for docking and undocking. Ships are berthed only during daylight hours.

Regulations.—Vessels are urged to contact the local authorities for information on regulations pertaining to navigation in the area on VHF channels 12, 16 and HF 2716 kHz.

perienced. Therefore, sufficient way should be kept so as to avoid being set onto either the S shore or upon the coral heads N of the channel. When the post on the NW point to Gea Island bears about 200°, course should be altered to 090° following the recommended track on the chart. When the stern of the wreck off Ennylabegan Island is abeam to starboard, alter course to 123°. When the vessel is abeam of Buoy No. 1, alter course to 135°. Alter course to keep Round House near the center of Kwajalein Island ahead at 135°.

Vessels entering the lagoon through South Pass should steer a course of 063°, passing about midway between the entrance buoys. When the NW tangent of Enubuj Island bears 147°, the course should be altered to 096°, being careful to avoid the charted shoal patches. When the Round House near the center of Kwajalein Island bears 135°, alter course to that bearing.

Vessels should approach Milu Pass on a course of about 170°. When Milu Island bears about ENE, follow the recommended track on the chart.

Take care to avoid the shoals, wrecks, cable areas, and other hazards when navigating within the lagoon, which are best seen on the chart.

Caution.—Due to the existence of wrecks and cables, vessels are cautioned against anchoring within the lagoon without first contacting local authorities.

During the season of the trade winds (June to October), a surge develops alongside the main piers on Kwajalein Island. Cargo operations are sometimes hindered and mooring lines are sometimes parted.

4.63 Lae Atoll (8°55'N., 166°16'E.) lies about 40 miles WSW of the W extremity of Kwajalein Atoll. The Lae Atoll has 10 or more islets, most of which are on the E side of the reef enclosing the lagoon. Lae Island, at the SE extremity of the atoll, is 2.4m high and the center of activities for the island group. A light, privately maintained, is shown on Lae Island.

Tides—Currents.—Strong currents set in and out of the entrance. There is a little or no current in the lagoon.

Aspect.—The only entrance is on the W side of the atoll, and is shoal and narrow. It should only be attempted by small vessels with local knowledge under only the most favorable conditions. The entrance is hard to identify, except when the sun is overhead. The reef on the N side of the entrance is hard to identify; the S side is generally marked by breakers. Vessels should enter by keeping about 45m off the breakers on the S side of the channel.

Anchorage.—Sheltered anchorage and good holding ground can be taken by small vessels with local knowledge in the lagoon. Anchorage has been taken about 0.3 mile N of the W end of Lae Island.

Caution.—Numerous scattered dangers lie in the lagoon, and in the area between the entrance and the anchorage off Lae Island. These dangers are identifiable under favorable conditions of light.

The lagoon has not been closely examined and uncharted dangers may exist. It was reported (1979) that islands exist where none are charted, and that some of the islands were of different shape and length than they appear on the chart.

4.64 Ujae Atoll (8°56'N., 165°45'E.) lies about 27 miles W of Lae Atoll. It consists of islets which are covered with

coconut palms. Ujae Island, located at the S extremity of the atoll, is the principal islet.

Bock Channel (9°02'N., 165°36'E.) is suitable only for small vessels with local knowledge, and then only under the most favorable of conditions.

Tides—Currents.—Tidal currents in Bock Channel are strong and unpredictable. A vessel entering 1 hour before LW experienced a 3 knot S set.

Anchorage.—Anchorage in the lagoon is not recommended as the bottom is very irregular.

4.65 Wotho Atoll (10°02'N., 166°01'E.) lies about 56 miles NNE of Ujae Atoll and consists of a number of islets on the reef enclosing the lagoon, all of which are covered with trees. **Wotho Island** (10°10'N., 166°00'E.) lies at the NE extremity of the lagoon and is the principal island.

Aspect.—Small vessels, with local knowledge, can enter the lagoon through Ombelim Channel and Medyeron Channel, on the W side of the atoll. It may be attempted only during the most favorable conditions. The least depth reported in these channels was 9.1m and 18.3m, respectively. The lagoon is studded with dangers.

Anchorage.—Anchorage is reported about 0.3 mile SW of the village on Wotho Island. Anchorage can also be taken off the SE side of **Medyeron Island** (10°11'N., 165°55'E.) and in the area N of **Begin Island** (10°07'N., 165°56'E.). These anchorages cannot be considered safe as dangers lie in their immediate vicinity and in their approaches.

Caution.—It was reported (1979) that Wotho Atoll was of a different shape than it appears on the chart.

4.66 Rongerik Atoll (11°16'N., 167°25'E.), located about 104 miles NE of Wotho Atoll, is comprised of about ten islands. The only islands which are wooded with coconut palms are Rongerik Atoll and Enewetak Atoll, located on the NE and SE extremities of the atoll, respectively. The other islands are lightly wooded. There are numerous coral heads within the lagoon.

Because of the effects of numerous nuclear experiments, radioactivity on Rongerik Atoll is considered to be at a higher level than that to which human beings should be exposed. Mariners are advised to keep clear of this area.

Eniwetak Pass (11°17'N., 167°28'E.), which is about 0.2 mile wide, appears to have depths of 18.3 to 25.6m. The channel has been swept to 12.5m within the limits shown on the chart. The dangers bordering on and within the channel are plainly visible under favorable conditions of light.

Bock Pass, on the W side of the atoll, is divided into several unmarked channels by detached shoals and reefs. The middle channel, which has a least depth of 21.9m, is preferred. There are patches, with depths of 5.5 to 7.3m, near the fairway. The pass is hard to identify from offshore.

Jedibberdib Pass, at the N side of the atoll, is shallow and suitable only for small vessels with local knowledge. The pass is to be used under only the most favorable conditions. It has been swept to a depth of 3.6m. A heavy swell rolls in during strong NE winds.

Anchorage.—Small vessels, with local knowledge, can anchor, in 27.4m, sand, about 0.3 mile off the lagoon side of

Eniwetak Pass. Care must be taken to avoid the reefs, which are hard to identify due to their dark brown color.

Caution.—The S end of the atoll is difficult to identify, except under the most favorable conditions, as there are no islands or sand cays. The reef fringing the seaward side of **Bock Island** (11°23'N., 167°22'E.) bares at LW to a distance of 0.25 mile offshore. Navigation within the lagoon is dangerous, except under favorable conditions of light.

4.67 Rongelap Atoll (11°09'N., 166°54'E.), lying about 18 miles W of Rongerik Atoll, consists of a number of small sandy islets, most of which lie on the E side of the atoll. Rongelap Island, Eniaetok Island, and Burok Island (Burokku Island) are covered with coconut palms; the rest of the islets are very sparsely wooded. A church and a small village has been built on Rongelap Island. Native crafts are obtainable.

There are nine entrances into the lagoon, three on the E side, four on the S side, one on the W side, and a small boat passage on the N side. South Pass, Kaeroga Pass, Northeast Pass, and Enybarbar Pass (Enibarubaru Passage) are considered to be the best and most important. The approaches to these passes are clear and can be readily identified under favorable conditions of light.

Tides—Currents.—The tidal currents in South Pass attain a rate of 1 knot on the flood and 1.35 knots on the ebb. They appear to turn at about the time of HW and LW. In 1979, an extremely strong W set was reported while entering the South Pass to Rongelap Atoll lagoon during ebb tide. With a ship's speed of 10 knots, a heading 014° to the right of track was necessary to maintain course.

Strong currents are reported in **Bikien Pass** (Pigen Pass) (11°10'N., 166°45'E.) and other narrow passes. Most of the water enters through the E passes and flows out through **West Pass** (11°21'N., 166°38'E.) and Kaeroga Pass. It was reported that there were strong flood currents in West Pass and Kaeroga Pass.

Depths—Limitations.—Numerous sunken rocks lie in the lagoon. An area, swept to 14.9m and having shoal spots swept to lesser depths, exists along the E part of the lagoon. It was reported that the NE part of the lagoon was strewn with reefs. It was further reported that the W portion of the lagoon appeared to be navigable, and to be free of coral heads, except for those lying quite close to the atoll reef.

Aspect.—South Pass is about 3.5 miles wide, but shoals divide the pass into several unmarked channels. The deepest channel has depths of 32.9 to 51.2m, and lies about 1.5 miles WNW of Rongelap Island. This channel has been swept to 14.9m. When the sun is high, the deep water portion of South Pass can be clearly distinguished from a position 1.5 miles to seaward. Between this channel and Rongelap Island, there are other channels which have been swept to various depths, within the limits shown on the chart.

Kaeroga Pass, about 9 miles WNW of the W extremity of Rongelap Island, is reported to be deep and clear. The channel, which shows clearly in contrast to the reefs on either side, is about 0.8 mile wide and has a reported depth of 27.4m. Numerous coral obstructions were reported (1963) to lie up to 1 mile N of Eniran Island (Enigan Island). The lagoon area within the entrance is reported to be clear of shoals, but no soundings are shown on the chart.

Northeast Pass, about 6 miles NE of **Eniaetok Island** (11°17'N., 166°54'E.), is about 0.5 mile wide. It has a least depth of 18.3m in the fairway, and has been swept to 14.9m over a width of 0.2 mile. Large vessels may use it. Vessels wishing to enter should steer for the E of two low islets on the atoll reef opposite the pass, on a course of about 335°.

Enybarbar Pass (Enibarubaru Pass), reported to be suitable for large vessels, has been swept to a depth of 14.9m on the W side and 10.6m on the E side, in 1927. A shoal, with a least depth of 11.9m, lies in mid-channel.

Anchorage.—Vessels can anchor, as convenient, in the swept areas of the lagoon. Vessels can anchor in a position about 0.8 mile off the lagoon side of Rongelap Island. Anchorage can also be taken off the N side of Mellu Island, located on the E side of Northeast Pass.

4.68 Ailinginae Atoll (11°07'N., 166°32'E.) lies about 7.5 miles WSW of the SW extremity of Rongelap Atoll. The atoll bares at LW and consists of a number of tree and bush-covered islets, most of which lie on the S and E sides. Coconut palms, trees, and moderate undergrowth are found on the S islands, and sparse undergrowth is found on the E islands. The shores of the islands are rocky, but there are a few sandy beaches. **Sifo Island** (11°08'N., 166°18'E.), on the S part of the W extremity, was reported as being visible from S from a distance of 16 miles, both visually and by radar.

Aspect.—Mogiri Pass, on the S side of the atoll about 2 miles from its W extremity, is the main entrance into the lagoon. In 1963, an examination of Mogiri Pass showed a least depth of 7.3m in the fairway. The lagoon appeared to have depths of 10.7 to 18.3m, except in the E part where several sandbars were noted.

On the E side of Mogiri Island, at the E side of Mogiri Pass, is Eniibukku Pass. It is encumbered with rocks and should only be used by small vessels with local knowledge.

Anchorage can be taken about 0.3 mile N of Mogiri Island, where it is fairly calm. The wind, at times, causes a heavy sea.

4.69 Bikini Atoll (11°30'N., 165°34'E.) consists of over 20 islands and islets lying about 46 miles WNW of Ailinginae Atoll. **Bikini Island** (11°37'N., 165°33'E.), covered by a dense growth of coconut palms and having a few buildings on it, is the principal island of the group. Some coconut palms also grow thickly on Enyu Island, about 4.5 miles S of the S extremity of Bikini Island. Three piers, each about 69m long, are situated on the SW side of Enyu Island. Bikini Atoll, from 1953 to 1971, was used as an atomic proving grounds.

Depths—Limitations.—General depths of 36.6 to 54.9m are found in the lagoon. Scattered shoals exist and are more numerous near the islands than further out in the lagoon. This is particularly true off Bikini Island.

Aspect.—A wooded tripod tower stands on the S end of Bikini Island. A prominent peaked building, painted a light buff color, stands adjacent to a concrete bunker near the S end of Enyu Island. It was reported that a prominent concrete bunker stands on **Airukiraru Island** (11°30'N., 165°24'E.).

Enirik Pass (11°30'N., 165°22'E.), in the middle of the S side of the atoll, is reported to be the best entrance; there is a least depth of 53m in the fairway, which has been swept to a depth of 14.9m over a width of about 0.15 mile.

Enyu Channel is situated on the E part of the S extremity of the atoll. It is about 8 miles wide, but there are a number of shallow banks in all but its E part. East Channel, about 1 mile wide and swept to a depth of 11.9m, is the best of the Enyu Channels.

Rukoji Pass, about 3.3 miles WNW of Enirik Pass, is about 2 miles wide, but shoal areas in the E part considerably restrict navigation. Depths of 7.3 to 36.6m are found in the fairway. An area, about 0.1 mile wide, has been swept to a depth of 14.9m.

Anchorage.—Anchorage, protected from NE winds, can be taken, in 20.1m, sand, about 0.8 mile from the beach on the lagoon side of Bikini Island.

4.70 Eniwetak Atoll, the NW outpost of the Marshall Islands, lies about 165 miles W of Bikini Atoll. The atoll consists of about 38 islands or islets strung along a circular reef, enclosing a lagoon, with a diameter of 20 miles. The highest land elevation is 4.2m, but some trees attain a height of 15.2m. Most of the islands are found on the E side of the atoll. The prohibited area surrounding Enewetak Atoll has been disestablished. Entry control to the area has been returned to the High Commissioner of the Trust Territory of the Pacific Islands.

Eniwetak Island (Enewotok Island) (11°20'N., 162°20'E.) (World Port Index No. 56350) has a submerged pipeline berth for oil cargo, close off the NW extremity. There is one berth available which handles vessels on a three-point mooring, two mooring buoys forward and one aft. The POL handling facility is reported to be dangerously close to the reef and caution should be exercised.

General cargo vessels load and discharge at the lagoon anchorage. Small piers are situated on **Medren Island** (Parry Island) (11°24'N., 162°22'E.), Enewetak Island, and on some of the islands in the group. The pier on the NW side of Medren Island is reported (1968) to be decaying and unusable.

Although Enewetak Island is W of the 180° meridian, the Time Zone Description kept is +12, or as though it were E of the meridian.

A seaplane area is established off the atoll reef, between Enewetak Island and Medren Island (Parry Island).

Tides—Currents.—A W current, which follows the contour of the encircling reef at a rate of 1.5 to 2 knots, has been experienced along the outer rim of the atoll. The tidal range is about 0.8m.

In South Channel, the flood set is W at a maximum rate of 1 knot about 1 hour 15 minutes after HW. The ebb sets SW at a maximum rate of 0.75 knot about 2 hours 30 minutes before LW. Slack water occurs 2 hours 45 minutes after HW, and 1 hour 30 minutes before LW.

In East Channel, the flood sets W at a maximum rate of 2 knots about 2 hours after LW. A maximum ebb of 1.25 knots, setting SE, occurs about 45 minutes before LW, and about 15 minutes after HW.

Depths—Limitations.—General depths of 20.1 to 54.9m are found in the lagoon. There are many coral heads scattered throughout, many of which are unmarked. The E half of the lagoon is swept to 13.7m, with shallower spots swept to lesser depths. Some of the most dangerous shoals are marked by buoys or beacons.

Aspect.—The two main passes into the lagoon are East Channel, on the SE side, and South Channel, on the S side. East Channel, the principal pass, lies between Japtan Islet (Muti Islet) and Medren Island (Parry Island). It is deep, about 0.7 mile wide, and has been swept to a depth of 13.7m over a width of 0.3 mile. At the inner end of the pass is Jedrol Islet (Bogen Islet), surrounded by a drying reef; between Jedrol and Japtan Islet there is a narrow channel leading NW from the main fairway. This narrow channel has been swept to a depth of 8.5m. There are no navigational aids for East Channel, and none of the dangers are marked.

South Channel, between Eniwetak Island and Ikuren Island (Igurin Island), is divided by shoals into two channels. The E channel (the main channel) has been swept to a depth of 13.7m over a width of 0.25 mile, and is centered 0.4 mile W of the W end of Eniwetak Island. The W channel, centered 3 miles W of Eniwetak Island, has been swept to a depth of 7.6m over a width of 1.5 miles. The entrances are not marked by navigational aids.

The S tip of Enewetak Island provides a sharp tangent for taking bearings.

Pilotage.—Eniwetak Port Control has been disestablished. No pilots are available. Vessels may contact local governmental authorities on Trust Territory Administrative frequencies.

Anchorage.—Eniwetak Atoll provides anchorage for all classes of vessels in the E part of the lagoon. Every vessel, having received permission to enter the lagoon, will be assigned anchorage by the Port Director. Anchorage is prohibited in East Channel and South Channel, due to the existence of submarine cables.

Directions.—Entry and departure from Eniwetak lagoon may be made only during daylight hours. A vessel entering by East Channel should do so on a course of 285°, to pass 0.4 mile S of the beacon on Japtan Islet (Muti Islet); when this beacon bears 041°, course should be altered to 263° into the lagoon.

A vessel entering by South Channel should do so on a course of about 350°, passing between 0.4 and 0.5 mile W of the W end of Enewetak Island, altering course as required.

Caution.—A magnetic disturbance of 1° has been reported in the vicinity of the atoll. A large Prohibited Anchorage Area is situated within the lagoon, and may best be seen on the appropriate chart.

4.71 Ujelang Atoll (9°46'N., 161°00'E.) lies about 118 miles SW of Eniwetak Atoll and has a number of sandy islets on its outer rim. A small jetty, flagstaff, and house are situated near the middle of the N part of Ujelang Island, lying at the SE extremity of the atoll.

Tides—Currents.—A maximum current of 2 knots has been reported in the middle of **Wide Pass** (9°49'N., 160°53'E.), about 5 miles WNW of the W extremity of Ujelang Island. The average direction on the flood was NE, and SE on the ebb. A countercurrent has been observed near the reef line on the W side of the pass. A strong SW set was reported about 2 hours before LW.

Narrow Pass, over 1.25 miles NW of the W extremity of Ujelang Island, has strong tidal current within it.

Depths—Limitations.—Depths of about 21.9m to over 36.6m are found in the lagoon. The greater part of the lagoon

has been swept to 9.8 to 11m, with some shoal spots swept to lesser depths.

The 1.8m shoal, located about 1.4 miles E of the inner end of Wide Pass, is dark brown in color and difficult to see even under the most favorable conditions of light.

Aspect.—There are two passages into the lagoon on its SW side. They are only available for small vessels with local knowledge, under favorable conditions of light.

Wide Pass is about 0.3 mile wide between the reefs on either side. The best water is one on the W side of the passage, close off the reef which fringes it. The channel is about 50m wide and has been wire-dragged to 4.3m. A least depth of 5.5m is reported in the channel, but vessels drawing 4.6m or more should only use the channel at HW.

Narrow Pass (9°47'N., 160°56'E.), about 3.8 miles SE of Wide Pass, is shoal, unmarked, and difficult to navigate. There is a confused sea and swell in the entrance during W winds.

Anchorage.—Vessels can anchor, in 29.3m, about 0.3 mile from the extremity of the reef in front of the house which stands near the middle of the N side of Ujelang Island.

Anchorage with good holding ground has been taken about 0.4 mile N of the flagstaff on Ujelang Island.

These anchorages are open to the Northeast Trades.

Caution.—Ujelang Atoll is reported to lie about 1 mile N of its charted position.

Wake Island

4.72 Wake Island lies about 304 miles NNW of Taongi Atoll, the N of the Marshall Islands. It is a U.S. possession with an area of only 3 square miles, consisting of three islands about 6.4m high, which form all but the NW side of an atoll enclosing a shallow lagoon. The NW side of the lagoon has a barrier reef which is visible at low tides and prevents any seawater entry to the lagoon. The higher parts of the islands are covered with a fairly heavy growth of scrub bush. The entire island group is surrounded by a shallow reef interspersed with coral pinnacles. There is no natural freshwater.

Wake Island (19°17'N., 166°37'E.) ([World Port Index No. 56330](#)) can accommodate three LCM's, which may serve as tugs or as cargo lighters. Ships should radio their ETA 48 hours in advance. An unloading wharf is situated on the SW side of the basin. There is a boat landing at the head of the basin. Two mooring buoys are moored in about 30m off the entrance of the boat channel, which leads into the boat basin. Cargo is discharged at the moorings. Sea conditions often permit a vessel to lie to offshore and discharge dry cargo; this is reported to be the safest and best method for large vessels. Oil is discharged through a floating hose which is floated out on barrels and connected to a fuel jetty at the E entrance point of the boat channel.

The restrictions imposed upon the entry into Wake Island Naval Defensive Sea Area has been suspended, except for the entry of foreign flag vessels and foreign nationals. The restrictions may be reimposed without notice at any time. Wake

Island is an unincorporated territory of the US, administered from Washington DC, by the Department of the Interior; activities on the island are managed by the US Army under a US Air Force permit.

Winds—Weather.—East and NE winds prevail throughout the year, with average velocities of 10 to 13 knots. Gales occur on an average of 10 days per year. By reason of its position, the atoll is subject to typhoons and tropical storms. Thunderstorms occur very seldom.

At Wake Island, the influence of the higher latitude is noticeable, and the means vary between a low of 25°C in January and February and a high of 28°C in September. In August the mean maximum reaches 31°C. Extremes above 35°C are rare.

The annual average rainfall is only 936mm, showing a great decrease in precipitation from that occurring in the lower latitudes. The monthly totals range from a January average of 29mm in the dry season to 180mm in August.

Tides—Currents.—A SSW current of 0.5 to 1 knot has been observed in the vicinity of Wake Island. There are occasions when the currents are erratic, and onshore sets have been observed. Vessels should carefully note the set and the drift of the tidal currents before attempting to moor. The tidal currents in the vicinity of the mooring buoys have been observed to set parallel to the shore at a rate of about 0.8 knot. The tidal range is from 0.6 to 1.2m.

Depths—Limitations.—On the seaward side, between Wake Island and Wilkes Island, there is a channel leading to a boat basin at the W extremity of Wake Island. Access is limited to craft of LSM size and smaller.

Unconfirmed depths of 25.6m and 18.3m were reported to lie in 32°09'N, 172°41'E and 32°08'N, 172°43'E.

Aspect.—A conspicuous concrete structure with storage tanks in the background is situated near the W end of Wake Island.

A prominent tower stands on Peale Island.

An aeronautical light (19°17'N., 166°39'E.) is shown from an abandoned control tower situated 0.6 mile NW of Peacock Point, the SE extremity of Wake Island.

It was reported that a ship obtained radar contact with Wake Island from a distance of 35 miles. The complete outline of the island was observed from a distance of 25 miles.

Anchorage.—The depths drop off sharply outside the atoll reef, making it unsuitable for anchorage. The lagoon itself is inaccessible. The mooring facility outside the boat basin is available to all vessels having permission to call at Wake Island, but is considered hazardous. The use of the anchor is not recommended when using these mooring buoys.

Caution.—Vessels should not attempt to secure at the mooring buoys in an onshore or S wind. If secured to one buoy when the wind shifts to blow onshore, slip the mooring and leave the area. Any vessel moored to only one buoy must have engines on standby. Vessels should be secured to the mooring buoys with the bow headed ESE. LCM's usually assist in mooring operations, with the best time being at either HW or LW slack.